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THE UNKNOWABLE.

By Richard A. Proctor.

SUN-WORSHIP.

The Sun as God of the Year.

BUT if the glory of the rising sun, the manifest power of the sun by day and the seeming conflict of nature attending the sun's daily departure, moved men of old times to adoration and to sacrifice, how much more, in a more advanced age, must men have been moved by the annual career, the alternate defeat and victory, of the great sun-god! We are so accustomed to the progress of the year, we watch with such complacency the steady alternations of the seasons, that we find it difficult to imagine the sensations with which men in past ages must have watched the gradual fading of the sun's influence as summer merged into autumn and autumn into winter. Whether the decline of the sun towards eventide was ever watched with anxiety we cannot know, but we can judge with considerable probability that it was not. For, however far back we trace the ideas of man, we always find the day measuring but a very small portion of each man's experience in time. Even before man in the lowest form of savagery existed, the day was recognised—unconsciously in those times, but not less really—as a short time-measure. The Gibbon ape, which welcomes the rising sun with noises and gestures of gladness, is not concerned when the sun is setting, though he and all creatures which show consciousness of the value of the sun's light and warmth at all, are troubled when the sun disappears in eclipse. If we could imagine man created suddenly *as* man, with no past experience through thousands of generations to guide him, we might regard as conceivable the anxiety described in Blanco White's well-known sonnet:—

> Mysterious night! When our first parent knew
> Thee from report divine, and heard thy name,
> Did he not tremble for this glorious frame,
> This wondrous canopy of light and blue?

As we might also conceive that imagined first man's wonder when

> 'Neath a curtain of translucent dew,
> Hesperus and the host of evening came,
> And, lo! creation widened on man's view.

Though we can hardly imagine the first man asking himself

> Who could have thought such darkness lay conceal'd
> Beneath thy beams, O Sun? or who could find,
> Whilst fly and leaf and insect stood revealed,
> That to such countless worlds thou mad'st us blind?

For even the wildest dreamer has not imagined that a first parent, besides being instructed in the names of all living creatures, had also received, on the first day of his life, such instruction in astronomy as would make the nature of the orbs of night clear to him. If he had, he would have been able to view with considerable complacency the departure "of the great setting flame," though he would also, I conceive, have been so sadly wearied that he would probably have been asleep almost ere the last ray of sunlight had disappeared.

Nor again, can we imagine that man, even in his earliest savage days, would have watched with very great anxiety the gradual falling off in the light of the moon, as day passed after day, from the time of full moon till the moon was lost altogether in the light of the sun. Possibly so soon as men began to watch the moon more carefully than of yore, anxieties may for a time have arisen each month, despite the long experience of lunar changes the race had already had. It would seem from the signs of rejoicing—the blowing up of the trumpet in the new moon—with which the Jews welcomed the moon's return, long after they had ceased to offer sacrifice to her as to a deity (only retaining an old ceremonial because it could not conveniently be dropped), that for a time in the history of each race an occasion for prayer and sacrifice, lest the moon should *not* return, had been recognised. Yet it is difficult to put ourselves in the position of races so childlike as to be afraid lest the waning of the moon meant her approaching decease.

But it is very different with the varying glory of the sun as ruler of the year. It requires very little effort to picture to ourselves the intense anxiety with which the sun's waning power in autumn must have been observed in the earlier days of agriculture. We may well believe that in still earlier times the gloom of winter inspired terror. But it must have been in the period of transition from the state of complete ignorance about the sun's annual motion to the time when the laws of his motion around the celestial sphere came to be clearly known, that men's anxiety lest the sun was actually departing altogether, when each autumn he sank day by day further south, must have been most fully developed.

Observe that in those times men would have thought nothing about the sun's circling motion round the star sphere. The circling daily motion around the sky they could not but notice. But the circling annual motion round the star sphere they would fail to recognise. Not one man in a hundred even now has clear ideas on this point, even if he knows the general teachings of astronomy. In the early days of agriculture all that men would notice would be that, after shining in glory high in the heavens at midday, and for a much longer time than he was below the horizon, the sun's power seemed to be declining. Shorter and shorter became the duration of his daily glory, less and less the fullness of the power attained when day was at its height. As this went on (during a period which to the child-man would seem very long indeed) doubt would be followed by anxiety, anxiety would be replaced by dread. It would seem a time for propitiation and entreaty. Sacrifice must be offered to the powers by which the sun-god seemed to be assailed and before whose continued assaults he seemed to be yielding. Nay, it would become a most solemn duty on the part of all the members of the community to join in prayer, in entreaty, in sacrifice. The man who did not afflict himself at that time would offend against the community, seeing that the sun-god whose return was longed for, or his enemies whose withdrawal or defeat was to be secured by sacrifice, might possibly fail to respond to the prayers and offerings of the people if even one single member of the community seemed careless in the matter. The same superstitiously selfish feeling which even in our own day manifests itself (as when men grow angry with those

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who recognise no Sabbath duties) would move the community to excommunicate, nay even to slay, the man whose soul was not duly afflicted when the sun-god was apparently deserting the people.

We can understand, again, with what alternations of fear and hope men would watch in those days the gradual diminution of the sun's rate of retreat. The approach of the solstice—or staying of the sun—would be a matter of no mere dry scientific interest, but moving all to earnest anxiety. As it gradually became clear to them that the sun's retreat would shortly be stayed, hope would grow more and more in their breasts. But what a time of hope, what a promise of salvation would there be when at last the sun's down-sinking was actually stopped, and observation showed that the sun-god was preparing to resume his glory!

Three or four days after the winter solstice the new birth of the sun-god would be made manifest. What in after years would be selected as an appropriate day to mark the (in truth, unknown) date of the birth of a Saviour of another kind—December 25, or thereabouts—would be the time when the Sun-God of earlier times was fully recognised as re-born. His birth on that morning, the day-spring and the year-spring combined, would be a time of peculiar solemnity, yet not to be marked either by sacrifice or propitiation, seeing that neither would fears then predominate over hope nor hope over fears. When he rose in the east (I am speaking of a time 3,000 years before the Christian era) the Virgin Constellation, with arms outstretched as if to receive him, was sinking in the west. As the Buddhist sun myth put it, the Virgin-Mother Maia paled before the growing glory of her son.

We can picture, too, the growing hopes with which the progress of the sun-god would be watched, until at length, day becoming equal to night, his triumph over the powers of darkness was assured. This, with the worshippers of the sun (and probably every race the world has yet known has, in a certain stage of its progress and for many hundreds of years, worshipped the orb which is our life as well as our light), would have been the veritable Passover of their God. On one side of the equator he was still shorn of his beams, as Samson (whose name implies that, like Herakles, he was a sun-god) was shorn of the flowing locks by which the solar rays were typified. For till the vernal equinox the hours of darkness are longer than the hours of light, but in crossing the equator the sun may be said to break through the bonds which have restrained him; his power is now declared; he has at length overcome his opponents; he rises from his wintry tomb.

If any doubt could remain that the Passover, whatever meaning free from Nature-worship Jewish legislators subsequently assigned to it, was originally a solar festival glorifying the Passover of the Sun-God, and later typifying the Crossing and Resurrection of Thammuz, it should be removed when we consider the significance of the association of the moon's movements with those of the sun in determining the time of the Passover, and with us the occurrence of Good Friday and Easter Sunday. However natural it may seem to the theological type of mind that an angel of destruction passing by marked doors on a special night should have started the remarkable observances of the Paschal feast, and again, however obvious it may seem to such minds that when Easter, with its Christian significance, came to be established, the Jewish rules for determining the time of the Passover should be adopted by Christian communities, it would in reality be altogether perplexing to reasoning minds that Jewish and Christian peoples should let the sun and moon define for them the dates of their most important feasts. It is simply inconceivable that if the slaughter of the Egyptian firstborn—poor little wretches, most of them—had marked the real beginning of the festival, the Jewish legislators, struggling as they had to do against a constant desire on the people's part to return to the worship of the sun and moon, should have decided—in the midst, too, of toilsome and dangerous journeyings—to fix the festival by observation of the sun and moon, and to consecrate it by observances strongly suggestive of sacrificial offerings to the sun and moon as deities. The return of the sun to power after a term of weakness, his victory after defeat, and the accompanying glory of the full moon, would assuredly have been regarded as very appropriate occasions, alike among the Egyptians and among the Babylonians,* for sacrificial observances. But such events as the massacre of the firstborn of Egypt, and the sparing of the firstborn of Israel, would not naturally be commemorated by a movable feast at all, and assuredly would not have been associated with ceremonies so suggestive of sun-and-moon worship. The difficulty of assigning any actual date to the events which Good Friday and Easter Sunday are intended to commemorate might perhaps justify the Council of Nice in definitely ruling that they should be determined by reference to a Jewish festival. The Council of Nice consisted of theologians, and would naturally enough fall into such a course, even while leaving Christmas-day a fixed feast. But those who are not theologians may be permitted to look farther back for the real origin of arrangements so specially astronomical as those by which Passover and Easter are determined, even if they do not recognise in Christmas the birth of the Sun-God, and in later festivals the modified records of the annual Crossing, Return to Power (or Resurrection), and Ascension of the orb worshipped at one stage of development or another by every race which has passed from savagery to civilisation.

That the progress of the sun from the equatorial crossing (risingly) towards the summer solstice, was regarded as the Ascension of the Sun-god, may be recognised even in the use of the astronomical word Ascension. For the right ascension of the sun (as of other heavenly bodies) is even now measured from this very crossing-place. Whether it be a mere coincidence or not, the facts remain, that regarding the winter half of the year (as we know some worshippers did regard it) as the time of the death of the Sun-god, his resurrection followed his crossing of the equator, and he advanced thence towards his glory and ascension (even astronomically defined as such). And after all, if we thus associate Christian festivals with sun-worshipping ones, formerly regarded as altogether sacred, we are only recognising in these special cases what has been recognised in multitudes of others—that pagan ceremonials retain their influence, their dates, their ceremonial, and even their associations, ages after pagan beliefs have passed away.

Here again, as in dealing with the morning and evening sacrifices originally offered in honour of the rising and setting god of day, we find that we cannot easily understand the offerings made at the time of the Passover as being seriously considered to be pleasing to Deity itself. The smoke from the fire which consumed burnt offerings, rising into the air and losing itself in the sunlit sky, might very well seem to sun-worshippers to be likely to please their god, supposed to be just a little above the heights to which the worshippers could themselves attain. The smell of the proffered food would be of a sweet savour to *such* a god. But to imagine that God, regarded as the creator of the whole universe, could be

* It is hardly necessary to say that nearly all the ceremonial observances described in the Pentateuch may be regarded as probably, if not certainly, belonging to much later times than they are associated with by the ill-informed.

pleased with such sacrifices, is in itself an idea about as near to blasphemy as any imagination of man's could well come—a truth which was very clearly perceived by the later teachers of the Jewish people, who speak with appropriate warmth of the insult to God which the idea of His being pleased with sacrifice assuredly involves.

Regarded in their natural sense, such passages as are emphasised in the following would be almost revolting; but, regarded as symbolical, they appropriately suggest recognition of the glory, might, and beneficence of the sun as emblems of the qualities men ascribe to Deity:—

"And in the first month, on the fourteenth day of the month, is the Lord's Passover; and on the fifteenth day of this month shall be a feast: seven days shall unleavened bread be eaten. On the first day shall be an holy convocation, *ye shall do no servile work*; but ye shall offer an offering made by fire, *a burnt offering unto the Lord; two young bullocks, and one ram and seven he-lambs of the first year;* they *shall be unto you without blemish;* and their meal offering *fine flour mingled with oil;* three-tenth parts shall ye offer for a bullock, and two-tenth parts for the ram; a several tenth part shalt thou offer for every lamb of the seven lambs; and *one he goat for a sin offering to make atonement for you.* Ye shall offer these beside the burnt offerings of the morning" (the risings of the Day God and Year God were combined at this season), "which is for a continual burnt offering. After this manner shall ye offer daily, for seven days, the food of the offering made by fire, *of a sweet savour unto the Lord;* it shall be offered beside the continual burnt offering, and the drink offering thereof. And in the seventh day he shall have an holy convocation; ye shall do no servile work."

All this would be very suitable at the return of a Sun God, who, if not welcomed with due rejoicings, and by such cessation from labour as only *such* a God can be supposed to desire, might go back again; precisely as the fast of the atonement six months later was very suitable at the seeming decay of the same God's power, who unless helped by lamentations and mourning might go out altogether. But all such observances have no fitter reference to the worship of an Almighty Omnipresent Being than the battering of pots and pans with which lower savages strive to arrest the departure of the sun in eclipse, or welcome his return soon afterwards (in response, as they believe, to their disturbances).

It is, however, when we consider the planets that we find the most curious evidence in regard to the old forms of worship.

COAL.

By W. Mattieu Williams.

THE ORIGIN OF COAL SEAMS.

IN the summer of 1855 I took a walk from Munich to Venice, and on my way through the Tyrol came upon a lake practically unknown to tourists, the Achen See, which lies nearly due north of Schwaz, about thirty miles from Innspruck, quite away from any of the main roads usually followed. It is an oblong basin, a depression of the Achen Thal, bounded by steep and densely-wooded mountain slopes. The water is unusually colourless and clear—so clear that taking a header from a steep bank into its depths was quite a sensational exploit; it appeared like a suicidal plunge over a precipice into thin air.

It was a hot day in July, and I accordingly revelled in a long swim. Looking down into the clear transparent water below me, I was surprised to see a subaqueous forest increasing in density as I proceeded farther and farther from the shore. There were trees standing quite upright, trees lying down, and trees leaning at every angle between the perpendicular and horizontal. I was alone, and my only means of further exploration was by diving. Where the trees were thickest it was too deep for this, but nearer the shore I was able to reach the bottom and bring up some of the soil, which proved to be a loamy powder of grey colour speckled with black particles of vegetable matter, apparently consisting of scaly fragments of bark and leaves. I brought up several twigs and small branches, and finally, after a few struggles, succeeded in raising a branch nearly as thick as my arm and about 8 feet long. The difficulty of raising it was caused by the greater part of its length being buried. This I brought ashore to examine at leisure.

The bark was entirely gone, the wood very dark, and the annular layers curiously loosened and separable from each other, like the layers of an onion. This looseness gradually diminished as I stripped off successive rings, and when the stick was thus reduced to about half its original thickness the wood became so compact that I could strip it no further. It appeared to be a branch of oak, and had become so completely saturated with water that it sank rapidly.

My walk from the north end of the lake to its southern extremity—*i.e.*, along its greatest length, about five miles—was always near to the water's edge, thus affording a complete panoramic view of its surroundings. This supplied a satisfactory explanation of the source of the great accumulation of trees in the lake. Here and there were long bare gaps breaking the continuity of the steep wooded slopes. These long alleys of denuded ground extended from above downwards, and had evidently been stripped of their trees by torrents, or landslips, or some such action. They were the tracks of vegetable avalanches, as shown by the uprooted trees that had escaped the general down-sweep, and were lying by the sides of the tracks. This theory of vegetable avalanches was confirmed by inquiries I made at the village near the southern end of the lake.

In 1856 I walked through a large part of Norway, and there was reminded of the Achen See by observing on some of the more precipitous shores of the fjords the tracks of tree avalanches. They are well seen in such parts of the great Sognefjord, the main trunk of which runs 120 miles inland, and its branches collectively add about another 120 miles to this. They are still more remarkable on some of the fjords further north, such as the Storfjord and its magnificent branches, the Slyngsfjord, the Sunelvsfjord, the Nordalsfjord, and the Geirangerfjord, now made easily accessible to tourists by the excursion steam-packet from Stavanger.

When I visited these in 1874 the tracks of vegetable avalanches were very numerous: two had come down during the last winter, and one in the previous October. The latter destroyed a boathouse and boat, and one of the others came within twenty yards of some farm buildings. As we passed, seeing it from the middle of the fjord, the track appeared nearly in contact with the house. They are so frequent hereabouts that the hardy mountaineers, who cultivate their little freeholds with that pertinacity and productiveness only known where the worker is the freeholder, display very sound dynamical foresight in selecting the sites of their houses. They build them on protrusions of the rock, which deflect the torrent when it descends against it. On rare occasions the shock is too much for the knob of rock, and it is swept down also. Such was the case in 1735, when the church of Slyngstad and many houses were destroyed.

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The present agency of man is tending to diminish the magnitude of these vegetable deposits—trees are cut down for house-building, for fuel, and for exportation. During only the present geological epoch, while these fjords and their wooded slopes have existed as they now are, countless millions of large trees must have thus been swept into the deep water in latitudes of most unfavourable climate for luxuriant vegetable growth, where there are but three or four months of growing summer time in the year.

What has become of all these? Remembering that the mountain slopes on which they grew continue downward at about the same angle below water as above, and thus extend to great depths, reaching in many cases to more than a thousand feet, it is evident that the stony matter, the gravel, the ground and splintered rock, will be deposited under water *at the foot of the slope*, while the trees launched forward by the impetus of their fall must float towards the middle of the estuary, there loiter and linger, and drift afloat until they become saturated with water, and then will sink to their final resting-place at the bottom of the fjord, which they will cover with some rude approach to uniformity, but thickening towards the middle, if the bottom slope is considerable.

The water of these fjords, and of such lakes as the Achen See, is remarkably clear and free from sedimentary matter, excepting at the mouths of the rivers that enter the terminations of their minor branches. Thus the tree deposit must consist of nearly pure vegetable matter, soddening, softening, and settling down century after century, during thousands and thousands of years, forming of necessity some kind of coal.

The difficulty that I have already pointed out as presented by the small quantity of mineral ash in coal does not here present itself; no soil is demanded for the formation of such a deposit as this. All the soluble mineral matter in the original plant material, such as the potash salts, would be washed out, and the only other material likely to take its place would be the very small quantity of impalpable particles that exist invisibly even in water that we call clear. Such is the actual composition of the mineral ash of most of our coal. Potash is nearly absent, and the material of the impalpable powder remaining behind when the coal is burnt completely is of about the same composition as the shaly strata above and below and beyond the coal seams.

Our coal seams occur in the form of basins and oblong troughs, *i.e.*, the form of lake and fjord bottoms; those who have specially studied the matter agree in regarding the material of coal as vegetable matter that has long been subjected to the action of water. As an example of the shape I quote the following description of our great northern coal-field by Hull ("The Coal-Fields of Britain," page 253): "Recent observations have tended to confirm the opinion that the structure of this coal-field is that of a trough, or irregular basin, of which the longer axis lies in a north and south direction, stretching from the apex near the mouth of the Coquet, through North Seaton and Yarrow collieries on the north of the Tyne, and through Monkwearmouth Colliery below the magnesian limestone to the south of that river." I might quote a multitude of similar descriptions of other coal-fields. On page 72 of the above-quoted work, Hull says:—"There can be no doubt that the laminated structure (of coal) is the result of accumulation under water, and Bischof adopts this view upon other considerations. He says:—'The conversion of vegetable substances into coal has certainly been effected by the agency of water.' The same great authority believes that coal has been formed, not from the dwarfish mosses, sedges, and other plants, which now contribute to the growth of our peat-bogs, but from the stems and trunks of the forest trees of the carboniferous period."

The fossils associated with coal are generally estuarine, sometimes marine, and occasionally lacustrine. As I am pleading for my own theory, I will quote again the same writer (page 66), who writes without any knowledge of my observations. He says:—"The coal seams are associated with strata deposited under water, and all recent investigation strengthens the probability that the water was *generally estuarine, sometimes marine.*" He then specifies and describes the particular fossils, such as *Goniatites, Aviculo-pecten, Orthoceras, Spirifer, Productus*, &c. He tells us of *Unios, i.e.*, fresh-water shells, found in the same stratum with marine *Modiola* and *Aviculo-pecten*, and the little coiled shell *Microconchus carbonarius*, which has puzzled able palæontologists, some having supposed it to be a coiled *Serpula* or *Spirorbis*. Also a minute crustacean abundant in coal shales, and supposed to have belonged to the fresh-genus *Cypris*, but is by some supposed to be a marine creature of the genus *Cythere*.

Here as in other descriptions I find a palæontological paradox, a puzzling confusion of marine, lacustrine, and estuarine creatures, that have sorely exercised the ingenuity of skilful palæontologists.

The great fjords of Norway, which for reasons I shall further discuss presently, may be regarded as typical of the configuration that prevailed during the carboniferous period, afford a key to this dilemma. The magnificent Hardanger-fjord is still larger than the Sognefjord. There were no steamers there at the date of my first visit, and consequently I did much boating on it. One hot day, when on one of its terminal branches, the Sörfjord, I was surprised to see the boatman dip a tin can into what appeared sea-water, and drink it freely. I did the same, and could distinguish no salinity. Yet on the rocks close by there was bladder-wrack (our familiar brown seaweed, that is buoyed by little blister-like bladders) growing near the water's edge, and many mussels. The mussels were all very small, and the wrack of light colour. Here, then, were just the anomalous conditions for sustaining such paradoxical creatures as are found in the coal measures; water certainly fresh enough for many river animals to live in, and yet salt enough to sustain marine animals and plants. The place where I drank the water was about ten miles from Odde, where the fjord terminates, and nearly 100 miles from the open sea. In one direction there is, of course, a gradually increasing salinity; in the other, a gradual diminution, owing to the inflowing rivers.

I should add that the upright trees found in the coal measure strata, and occasionally with their roots actually in the coal seams, which have mainly supported the theory that the vegetation forming the coal seams actually grew on the spot, are easily accounted for by my theory of coal formation, seeing that some of the trees swept down carry a certain quantity of soil or fragments of rock entangled in their roots. These, of course, compel the tree to float vertically in deep water, and if they are not washed away the tree will sink in this position. This also accounts for the anomalous fragments of shaly rock that every burner of coal knows are sometimes imbedded in the best of samples. Their frequent and yet anomalous occurrence in the midst of a deposit where the general mineral matter is so very finely divided, demands explanation, and no theory which does not grasp them can be satisfactory.

I may add that I have lately learned that vegetable avalanches, similar to those above described, occur on a very grand scale in the Straits of Magellan. They are there associated with landslips, and their vestiges in the form of smooth striated rock have, until lately, been attributed to glaciation, but recent observers have corrected this mistake.

It should be noted that if any approach to the exceptionally hot and humid climate, generally supposed to prevail during the carboniferous period, actually did exist, the luxuriance of vegetation on the slopes of the fjords of that period must have been vastly greater than those of Norway, and the rate and quantity of vegetable deposition proportionally magnified.

I have yet to consider the peculiarities of the strata above and below the actual seams of coal; will describe them and discuss their formation in my next.

THE STORY OF CREATION.

A PLAIN ACCOUNT OF EVOLUTION.

By Edward Clodd.

VI.—THE PAST LIFE-HISTORY OF THE EARTH (*Concluded*).

THE warm climates of the Secondary epoch prevailed far into the Tertiary, but were followed by declining temperatures, which at last resulted in the long and intermittent period of intense cold known as the Glacial epoch, when large areas of Europe and North America were swathed in ice, which gouged and moulded the subsiding land, choking the sea with *débris*, and destroying numberless species of plants and animals, to the lasting biological impoverishment of after times. In the end the temperature rose to its present level.

The Tertiary epoch marks the beginning of the present order of things, of the distribution of land and sea, and the uprising of most of the great mountain chains. Although much of the existing land area was then submerged under shallow seas, the continents of both hemispheres had wellnigh the same outlines as now. Varied as are the life-forms of that epoch, unrelated and, save in the nummulitic limestones, detached as are the strata, those life-forms manifest a gradual approach to existing species, and a marked divergence from the species of older epochs. The colossal reptiles of Jurassic and Cretaceous times, the coiled ammonites and other mollusca of their seas, are extinct. The Age of huge Reptiles has given place to the Age of huge Mammals, with its intermediate forms, but with no one species dominant, and with no important species unrepresented.

The links between the Secondary and the Tertiary epochs are, with rare exception, only meagrely represented by any known strata, for denudation has wellnigh swept away the intermediate deposits with their contents. And so confused are the Tertiary strata that their order in time is determined solely by the proportion of their shell-fish to existing species, ranging from as low as three per cent. in the oldest beds to ninety-five per cent. in the newest. Mollusca have been called the alphabet of palæontology, because their extensive distribution through the several epochs renders them the most valuable and trustworthy of all organic remains in assigning the order in time, and the conditions of life, not only of their own species, but of other species whose life-history is briefer, and whose range is more limited.

The rocks of the Tertiary epoch witness to wide-spread aqueous and volcanic action. This is specially noticeable in the Eocene strata, prominent among which are the vast beds of limestone laid down when Europe, its north-west corner excepted, and Central Asia were covered by the sea, and which extend from the Pyrenees to China and Japan, and also largely compose the Alps, Carpathians, Himalayas, Atlas, and lesser mountain-chains. Not many noble nor mighty are called to the enduring tasks of nature. It is the minute agents, unresting and wide-spread, that have been the efficient causes of much that is grandest in earth-structure, and it is of shells of the coin-like nummulites that these stupendous formations are mainly composed. Their foundations were laid in Archæan times in the deep, broad fissures opened in the crust by volcanic action. Into these fell the sediment and organic deposits of ancient seas, which ultimately, as the cooling crust caved-in by its own weight upon the shrinking hot nucleus, were squeezed and puckered and overturned by lateral pressure into numberless folds. Then, when the twisted and crumpled strata were upheaved above sea level, water and the powers of the air sculptured them into pinnacle and peak, into ravine and valley. So the big mountains, as we know them, are relatively modern; the lesser ones are the older, as longest subject to the wear and tear of eroding agents. Mont Blanc and the Matterhorn are not older than the Eocene marine clay on which London stands, and the Rigi, a freshwater shingle-bed, is younger still.

Broadly grouping the life of Eocene seas, we find large whales, teleost or bony-skeletoned fish in abundance, and the persistent ganoids. Birds are in the air; crocodiles and turtles swarm in the shallows;* snakes and serpents make their first appearance; the mammals are no longer restricted to pouch-bearers, for the placentals have invaded Europe in large numbers—huge quadrupeds, carnivora, hornless deer, and hog-like forms of a type between the tapir and the horse. Among the most remarkable fossils from North American beds are those of the ancestor of the horse, a creature about the size of a fox, with four hoofed toes on each foot, and in one form (*Eohippus*) with the rudiments of a fifth toe, of the importance of which more anon. A still more significant biological link is found in the lemuroids of the Upper Eocene (which belong to the Primates, or order of mammals including man and ape), possessing characters allying them to one or other of the hoofed quadrupeds then living. The plants, which were slowly dispersed over the Northern hemisphere from Polar regions, were tropical in character, as shown by remains in the Thames delta and corresponding deposits.

The like applies to the flora of early *Miocene* (in which is included *Oligocene*) times, when timber-trees, evergreens, and water-lilies flourished within eight degrees of the North Pole, with which Europe and America were connected by way of Iceland and Greenland, although, such are the puzzling climatal variations of past epochs, icebergs were then floating in Northern Italy. The animals approximate more nearly to those of the present, save in the huge size of the mammals, as the mastodon and other creatures allied to the elephant; monkeys as large as a man appeared; the horse corresponded more nearly to his modern descendant, the variation being that each foot had three toes, of which only one touched the ground. Birds and insects were abundant: of the latter 1,300 species have been found in Switzerland alone.

The *Pliocene* period ushered-in great local changes in land and water distribution. The lofty ridge, clothed with oaks and vines, that had stretched from France to Greenland, and the remnants of whose lofty volcanic chain, of which Hecla is the sole active relic, are extant in the Hebrides and the highlands of Scotland and Wales, was submerged. Europe was thus severed from America, but Britain was left as a peninsula, the newly-invading waters of the North Sea dividing Scotland from Norway. On the other hand, the Eurasian continent was upraised in parts, leaving the deeper basins of the Black, the Aral, and the Caspian

* "More true turtles have left their remains in the London clay at the mouth of the Thames than are known to exist in the whole world."—Sir R. Owen, "Palæontology," p. 281.

Seas as remnants of the shallow waters that had linked together the Baltic and the Persian Gulf, the Arctic and the Indian Oceans.

Except in the gradual extinction of the larger species, the hippopotamus alone surviving to this day, the mammals varied little from those of the Miocene, the most remarkable among the carnivora being the fierce sabre-toothed felines. But fauna and flora alike witness to a cooling climate. The life-destroying agencies are at work; the cold fingers of the ice-giant are being spread over the northern hemisphere to the 50th parallel of latitude, dinting and rounding its surface, and leaving to this day the traces of their impress in the snow-fields and glaciers of Scandinavia and Switzerland.

Upon the glacial deposits, or boulder clays, only the most recent of which contain fossils, and these poor and scanty, rest the strata of the present geological epoch, the *Quaternary*, or *Post-Tertiary*, or *Pleistocene*, as it is variously called. This is subdivided into the Post-Pliocene and the Recent, the former containing the remains of many extinct animals, as huge wingless birds and sloth-like mammals; and the latter the remains of none but existing species. It is to some early, perhaps a milder interglacial, period in the Quaternary epoch in Western Europe that the first appearance of man, the latest and highest animal, is to be referred, the evidence of this being more in his works than in himself, for the scantiest remains of his fragile skeleton have been preserved. The roughly chipped stone tools and weapons with which he made shift have been found buried in ancient river gravels with bones of the mammoth or woolly-haired elephant and other arctic animals, as well as with bones of temperate and tropical animals, witnessing to sharp alternations of climate. Stone implements and rude works of art of a somewhat more advanced race, possibly allied to the Eskimo, have also been found associated with remains of sub-arctic animals in limestone caverns. How long before this man appeared on the earth, or whence came the Drift-men and the Cave-men, we cannot say. So far as our present imperfect knowledge of "primitive" man goes, the Palæolithic or Old Stone Age marks the limits of his place in the life-record. A wide gap of different conditions separates the rude savages of that age from the progressive races of the succeeding periods into which pre-historic time is divided—namely, the Neolithic or Newer Stone Age, the Age of Bronze, and, lastly, the Age of Iron, which merges into the brief and modern period embraced by the historian.

In the foregoing rapid summary of the earth's past zoology and botany much of detail has been left out for clearer presentment of the typical features of each epoch and of the scale of life as an ascending scale. The older the rock the simpler the life-forms.

The lichen and the seaweed, stemless and leafless, are lower than the club-moss and the tree-fern; these are lower than the true timber-tree with its complex arrangement of trunk, branches, leaves, flowers, and fruit. The shapeless amœba is lowest in the scale; the sponge, rooted plant-like to the rock, is lower than the coral or the starfish; these, again, than crabs or shell-fish, the most highly organised of which are lower than the vertebrates, between the several groups of which the ascents are manifest in fish, reptile, bird, and mammal. And among these last there are the lesser and the greater; the pouch-bearers, bringing forth their young immature, are less specialized than the placentals, bringing forth their young fully developed; while here, also, the ascending grades are seen in whales, ungulates, carnivora, monkeys, men.

To all which the fossil-yielding rocks bring their witness. Imperfect as is their record, obscure as in certain cases are the causes of modification resulting in the appearance of new types, the evidence as to ascent of life from the simple to the complex, and as to its succession, is overwhelming. There was a time when the earth was devoid of life, and we are doubtless very far from its "protoplast" beginnings in the earliest known organic remains, just as all species probably came into being long before we have any trace of them. But no evidence as to their real first appearance that may be gathered from parts still unexplored is likely to alter the relative order assigned to the several types as compared with one another.

Table of the Successive Appearance of Typical Life-Forms.

Epoch.	System.	Animal.	Plant.
Eozoic (Earliest Life-forms)	Laurentian	*Eozoon Canadense* (?)	
	Cambrian	Sponges; corals; crustacea; shell-fish	Sea-weeds, club-mosses
	Silurian	Huge crustacea; the lowest known vertebrates (ganoids or armoured *fish*)	
Primary or Palæozoic (Age of Ferns and Fishes)	Devonian	Insects; swarms of ganoids	
	Carboniferous	Land vertebrates (Labyrinthodonts)	Ferns, calamites, cycads
	Permian	*Reptiles*	
Secondary or Mesozoic (Age of Pines and Reptiles)	Triassic	Immense reptiles; *marsupial mammals*	
	Jurassic	Immense bird-reptiles; true *birds**	Conifers, palms
	Cretaceous	Bony-skeletoned fish; large ammonites	
Tertiary or Cainozoic (Age of Leaf-forests and Mammals)	Eocene	Huge *placental mammals*; serpents; nummulites	Trees, shrubs, herbs allied to existing sub-tropical species
	Miocene and Pliocene	True whales; Man-like Apes	
Quaternary	(Glacial ing into the) Post-Pliocene	Epoch intervening, and continu- Mammoth and other woolly quadrupeds; Man	Arctic and temperate
	Recent or Historic	Existing species	Existing species

* The discovery of the lowest mammalian forms in earlier strata than those containing birds seems opposed to the accepted order of succession, but there is considerable uncertainty as to the exact period of the first appearance of birds.

The history of the earth is written by fire and water; its life-history by water alone.

The volcanic and other modes of igneous disturbance that have upheaved, depressed, contorted, and fissured its cooling crust are due to the internal energy manifest in the escape of pent-up heat and in chemical action. The more potent agents of change in the visible crust, however, have not been from within, but from without. As the internal energy, derived from contraction of the hot nucleus, decreased, the energy derived from the sun became more effective, giving rise to changes wherein variations of temperature and the circulation of air and water over the surface of the earth would come into play. It is to these—to the solvents of the atmosphere and rain, to the driving wind, to water in its several states and movements, whether of disrupting frost, grinding glacier, eroding river, or waves and currents of the sea—that the five-and-twenty miles and more of stratified rocks (for the same stuff has been used over and over again), with all the varied contour of the earth's surface, are mainly due.

Vast, slow, and continuous as are the changes, they occur within defined limits. The deep ocean basins, the lines or seams of the great mountain chains, have probably been permanent from the remotest geological epochs, and the variations in land and water distribution have been confined to certain areas. All the evidence furnished by the aqueous rocks, from the earliest primary to the alluvial formations of to-day, point to their tranquil deposition on the floors of relatively shallow seas, where they have been converted by pressure and other means into solid beds, entombing organic

remains which give the key to their relative place. Then, on their upheaval above the sea, the eroding agents have begun their slowly levelling work, and the *débris* of lands, where life-forms have flourished and perished, has returned to the waters whence they uprose, to become once more "the dust of continents to be." And so "the thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun." Between the opposing agents of waste and repair, of upheaval and subsidence, with interplay of the organic in growth and decay, as in limestone ranges, coral isles and coal beds, and the action of man himself for evil or good on nature, the ancient earth is maintained from age to age mother of all living.

MIND ACTING ON BODY.

By Richard A. Proctor.

THERE are few circumstances in mental physiology more surprising when rightly understood, few perhaps more suggestive, than this, that ideas conceived in the mind—that is, as we are in the habit of supposing, the results of processes taking place in the grey matter of the brain—should influence not only voluntary but involuntary bodily processes, nay, not only respiration, circulation, and so forth, but the various processes of secretion on which the nutrition of different parts of the body depends. There is no novelty, of course, in the recognition of this circumstance, though I venture to express the belief that quite a large proportion of those who may read these pages will find considerable novelty in some of the evidence I shall adduce. But the fact that the relations here considered have long been recognised by physicians and students of mental physiology does not detract from the interest of the problem presented by these relations. It may truly be said that as yet they have not been in the least degree explained. Yet the problem is not one which appears at a first view so hopelessly beyond all our attempts at solution as some which are connected with mental and corporeal matters. We can understand, for instance, that the student of mental physiology should at present turn hopelessly from the attempt to explain how thought should in any way depend on changes in the substance of the brain, or again, from the task of attempting to determine how, by any process of evolution, the phenomena of consciousness should have been developed from cerebral changes which in their simpler form appear to result in automatic movements. But we have no such seemingly hopeless problem in the subject now to be considered. For in reality it amounts simply to the question how or why certain changes in one part of the body lead to changes in other parts of the body. The distinctions between mind and matter, between thought and cerebral activity, are not here involved. A problem apparently physical, and physical only, is submitted to our investigation. Yet hitherto the solution of this problem has not been attained; nor, indeed, does there seem at present to be good reason for regarding it as attainable.

Let us turn, however, to the consideration of certain remarkable illustrations of the influence of the mind on bodily functions. The subject is specially suited for the use of the inductive method. Indeed, the chief difficulty we are likely to find in the application of this method resides in the probability that our space will be too limited to afford room even for a single instance of each class of illustrative cases.

By a coincidence it so chances that the great modern advocate of the inductive method of research—Francis Bacon—supplies a very effective piece of evidence as to the influence of the imagination on external growths which seem to have their origin in deficient vitality of certain parts of the external surface of the body—as warts, wens, and the like. Bacon did not, however, treat the evidence afforded in his own case with the acumen which might have been expected from the inductive philosopher. "I had from my childhood," he says, "a wart upon one of my fingers; afterwards, when I was about sixteen years old, being then at Paris, there grew upon both my hands a number of warts, at the least an hundred in a month's space. The English ambassador's lady, who was a woman far from superstition" (a statement which must be taken *cum grano*), "told me one day she would help me away with my warts; whereupon she got a piece of lard with the skin on, and rubbed the warts all over with the fat side; and amongst the rest that wart which I had from my childhood; then she nailed the piece of lard, with the fat towards the sun, upon a post of her chamber window, which was to the south. The success was that within five weeks' space all the warts were quite away, and that wart which I had so long endured for company. But at the rest I did little marvel, because they came in a short time, and might go away in a short time again; but the going away of that which had stayed so long doth yet stick with me."

Bacon considered the result of the experiment to have been due to some sympathy which he supposed to exist between the lard and the warts after they had once been in contact. It is difficult for us to understand how so absurd an explanation could even for a moment have been entertained by Bacon—not when, as a mere boy, the experiment was successfully tried upon him, but in after years, when he had learned to study the relations of cause and effect. The servant who places a poker across the top bar of the grate, under the impression that in some occult way the fire will be made to burn more actively through this arrangement, adducing this or that case in which a fire so treated did burn up as sufficient proof that the method is infallible, does not seem to reason (if one can call such a mental process reasoning) more absurdly than Bacon did when the experiment which "so stuck with him" satisfied him that the drying of grease which had once touched his warts could cause the warts themselves to disappear, though the skin was hung up in one place while he and his warts were in other places, and no contact remained between the warts and the skin of lard. If the idea of some occult sympathy between the fat and the warts could really arise in a mind "far from superstition," one would suppose it must have occurred to Bacon that the justice of this idea could be very readily put to the test. He had only to apply a skin of lard to some one's warts, and then submit the skin to a variety of more active processes than mere sun-drying, inquiring whether the warty person found sudden relief, sudden pain, or any effect whatever, when the nature of such experiments was kept concealed from the said patient. One can understand that those who were not far from superstition might imagine the experiment to be really rendered effective by charms, prayers, and incantations, or by some mystical ceremonies or other which were not disclosed to the patient. We know that in Bacon's time, and to a far later date, the efficiency of such magic devices was believed in by many who called themselves philosophers. To this day there are many who are foolish enough to indulge in such beliefs. But Bacon regarded the process of cure as purely natural, though, as one would suppose, the evidence against such a view should have appeared insurmountable to a man of his reasoning power. We must, however, remember that in his day it must have appeared almost, if not quite, as unreasonable to assume that the

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imagination could affect a part of the body, as that some secret sympathy might exist between a part of the body and some substance which had touched it. Many readers will remember that Sir Kenelm Digby, in a work published as late as 1658, discusses gravely the influence produced on a badly wounded hand by bathing a garter, which had been stained with the blood, in a basin of water wherein a certain powder had been dissolved. "As soon as the bloody garter was put within the bason," the wounded man "started suddenly as if he had found some strange alteration in himself." "I asked him what he ailed?" proceeds the narrator. "'I know not what ailes me, but I find that I feele no more pain. Methinks that a pleasing kind of freshnesse, as it were a wet cold napkin, did spread over my hand, which had taken away the inflammation that tormented me before.' I replied, 'Since then that you feel already so good effect of my medicaments, I advise you to cast away all your plaisters; only keep the wound clean, and in a moderate temper betwixt heat and cold.' This was presently reported to the Duke of Buckingham, and a little after to the King, who were both very curious to know the circumstance of the businesse, which was" (the story is not so distinct here as could be wished) "that after dinner I took the garter out of the water, and put it to dry before a good fire. It was scarce dry, but Mr. Howell's servant came running, that his master felt as much burning as ever he had done, if not more, for the heat was such as if his hand were 'twixt coles of fire. I answered, although that had happened at present, yet he should find ease in a short time; for I knew the reason of this new accident, and would provide accordingly; for his master should be free from that inflammation, it may be, before he could possibly return to him; but in case he found no ease, I wished him to come presently back again; if not, he might forbear coming. Thereupon he went; and at the instant I did put again the garter into the water: thereupon he found his master without any pain at all. To be brief, there was no sense of pain afterwards; but within five or six days the wounds were cicatrised, and entirely healed." Sir Walter Scott, in speaking of such stories as these, expresses the opinion that possibly the cure may have resulted from the care with which the wound was in the first place washed. It will be observed, however, that Sir Kenelm Digby's account does not countenance this explanation. Nor, if one could accept it as it stands, could one adopt the idea that the imagination of the patient produced the changes of feeling described. For it is clearly stated that the patient felt relief before he knew that the garter had been placed in the basin of water; that the pain returned when the "chirurgeon" in another house had dried the garter, and that the pain disappeared before the return of the messenger who carried back the promise of relief. If such stories as these were current in Bacon's time, and were generally believed, his explanation of the disappearance of his warts, confirmed as it seemed by what he knew of the actual circumstances, may have seemed to him as philosophical as to us it appears absurd.

So the faith, which prevailed for many years after Bacon's time, in the efficacy of the Royal Touch must be regarded as based to some degree on evidence, though the evidence was misunderstood. In days when many believed that a certain divinity doth hedge a king, it was natural that in the first place the imaginations of those folks of feeble vitality, and often of deficient mental power, who were brought to kings to be touched, should be so far affected as to cause such bodily changes as we now know to be produced by a strongly excited imagination; and that in the second place the persons thus cured, and those who heard of such cures, should attribute the effect to the virtue of the kingly touch, not to the influence of mere mental processes. Dr. Todd, in his "Influence of the Mind on the Body," quotes a singular passage from a book by Browne of Norwich, surgeon to King Charles II.—a book rejoicing in the title "Adenochoiradelogia; or, a Treatise of Glandules, and the Royal Gift of Healing them." "A Nonconformist child, in Norfolk," says Browne in the passage referred to, "being troubled with scrofulous swellings, the late deceased Sir Thomas Browne, of Norwich, being consulted about the same, his Majesty being then at Breda or Bruges, he advised the parents of the child to have it carried over to the king (his own method being used ineffectually); the father seemed very strange at his advice, and utterly denied it, saying the touch of the king was of no greater efficacy than any other man's. The mother of the child, adhering to the doctor's advice, studied all imaginable means to have it over, and at last prevailed with the husband to let it change the air for three weeks or a month; this being granted, the friends of the child that went with it, unknown to the father, carried it to Breda, where the king touched it, and she returned home perfectly healed." The worthy doctor is careful that the moral of the story should not be overlooked. "The child being come to its father's house, and he finding so great an alteration, inquires how his daughter arrived at this health. The friends thereof assured him, that if he would not be angry with them they would relate the whole truth; they having his promise for the same, assured him they had the child to be touched at Breda, whereby they apparently let him see the great benefit his child received thereby. Hereupon the father became so amazed that he threw off his Nonconformity, and expressed his thanks in this manner:—'Farewell to all dissenters, and to all nonconformists! If God can put so much virtue into the king's hand as to heal my child, I'll serve that God and that king so long as I live, with all thankfulness.'" It was found later that Hanoverian kings had the same power as the Stuart, even as old Aubrey had noted of the Yorkist and Lancastrian kings. "The curing of the King's Evil," he said, "by the touch of the king, does much puzzle our philosophers, for whether our kings were of the house of York or Lancaster, it did the cure for the most part." And so no doubt it would if the patient had been touched by one of the Gentlemen of the Bedchamber, or by the valet of such a one, or in fine by Tom Noakes or John Styles, so only that the patient was fully persuaded he had been touched by the rightful monarch.

Another "royal personage" succeeded (by a coincidence singular enough, at the same place, Breda) in curing a number of men of a much more active disorder, though in this case the imagination was aided chiefly by the ideas suggested by medicine-bottles of orthodox shape, not solely by faith in royal blood. During the siege of Breda in 1625 many soldiers of the Prince of Orange's army were prostrate with scurvy. The mortality was serious, the patients having altogether lost heart. "This," says Dr. Frederic Van der Mye, who was present, "was the most terrible circumstance of all, and gave rise to a variety of misery; hence proceeded fluxes, dropsies, and every species of distress (*omne chaos morborum*), attended with a great mortality." At length the Prince of Orange sent word to the sufferers that they should soon be relieved, and provided with medicines pronounced by doctors to be wonderfully efficacious in the cure of scurvy. "Three small phials of medicine were given to each physician, not enough for the recovery of two patients. It was publicly given out that three or four drops were sufficient to impart a healing virtue to a gallon of liquor." "We now," says Van der Mye, "displayed our wonder-working balsams, nor were even the commanders let into the secret of the cheat put upon the soldiers. They flocked in crowds about us, every one soliciting that part might be reserved for their use. Cheerfulness again appears in every

countenance, and a universal faith prevails in the sovereign virtue of the remedy. . . . The effect of the delusion was really astonishing: for many quickly and perfectly recovered. Such as had not moved their limbs for a month before were seen walking the streets sound, upright, and in perfect health. They boasted of their cure by the Prince's remedy. . . . Many who declared that they had been rendered worse by all former remedies, recovered in a few days, to their inexpressible joy, and the no less general surprise, by taking (almost by their having brought to them) what we affirmed to be *their gracious Prince's cure*." We may add that on another occasion widespread scurvy was suddenly cured in a very different way: it is stated on good authority, says Dr. Todd, "that in 1744 the prospect of a naval engagement between the British and allied fleet had the effect of checking the scurvy."

(*To be continued.*)

ORIGIN OF THE TEUTONIC LANGUAGES.*

THIS work is a valuable introduction to Teutonic philology, and will be found full of interest by many who regard the study of language from without—in the same sense that the geologist regards the study of chemistry or the palæontologist the study of botany. It is in this last respect that we propose here to deal with the book, and we select, as an illustration of its value and interest, the treatment of the Indo-European languages in the third chapter. We believe that a better idea of the qualities of a book may be obtained by thus examining at full length a selected portion than by attempting to present a summary of the whole in a necessarily imperfect manner.

The languages of the Indo-European family, belonging to the Indo-European races, may be grouped under nine principal heads.

First, we have the Indian group, in which we find the oldest extant form assumed by the original language as it broke up into dialects. The Vêdas are in a language which, though written, represents evidently what was the language spoken by the people when the Vedas were composed. It is, indeed, known that the Vedic hymns existed long before they were consigned to writing. We have in Sanskrit (*i.e.* the language "put together" or "perfect") a language which was developed from the older spoken language, and differing doubtless in some respects from its original; but, though simplified and reduced to a fixed form, it was true in sound and grammar to the older language, just as the English of our books is true to the English spoken by the people. Sanskrit is still employed by the learned in India, just as Latin was employed in Italy long after it had become a dead language in its own home. The ancient popular language in India was called Prâkrit ("vulgar" or "copied"). The modern popular dialects in India are the Hindustani, the Marathi, the Bengali, &c. (The older races did not call themselves Indians, but Aryans.)

Secondly, we have the Iranian group, more properly called Eranian—now the Persian—also calling themselves Aryan, from "Aryas," true or noble, whence Eran is directly derived. We have very ancient works of old Persian in cuneiform inscriptions relating to Darius, Xerxes, and Artaxerxes. These inscriptions are numerous enough to give a good idea of the language. Of the old Bactrian, or East Eranian language, called Zend, we have specimens in the Avesta, or sacred writings of the Parsees. The language shows signs of great antiquity. In the commentaries on the Zend Avesta we have samples of the Middle-Eranian languages, which present many Semitic and Arabic words. The finest example of modern Persian is the Shahnameh or Book of Kings, dating from 1051 A.D. Modern Persian has a simple grammar—simpler even than English; it does not even mark gender in the third personal pronoun.

Thirdly, we have the Armenian group, connecting the Asiatic and European. The Armenian language has many features in common with the European languages of the same family. It is interesting as giving us the only evidence we have about the languages spoken by the Phrygians, Lydians, Carians, and other extinct peoples of Asia Minor.

Fourthly, we have the Greek group. The languages of this group differ little from each other, being rather dialects than distinct languages. (Professor Meyer, of Graz, has, however, suggested that Albanian is an offshoot of the Greek family, and, if this is so, we certainly have in it a language which shows more than a dialectical difference from the Greek.) We find in Greek the signs of greater antiquity in some respects even than in Sanskrit. This is to be recognised in the Doric and Æolian dialects more clearly than in the Ionian and Attic. The differences between the imperfect and the aorist, between perfect and pluperfect, and between optative and conjunctive, are especially characteristic of antiquity, as are also the dual forms in declension and conjugation. Modern Greek is a true development from ancient Greek, not a distinct language.

Fifthly, comes the Italian group. The original language is not known. But in Old Latin, Umbrian, and Oscan, we have its immediate offspring. (Etruscan is doubtful, and Messapian does not belong to the Italian group.) Latin, as we find it in literature, was not spoken at any time which can be defined. The spoken language changed constantly, but written Latin remained without change. It was only when the changes of dialect had left written Latin an entirely distinct language that the new dialects came to be themselves employed in writing; so that the various Romance languages were spoken long before we have any written record of their existence. Of these Romance languages the modern representatives are the Italian, Roumanian, and Romaunsh (spoken in the Engadine) in the east; the Spanish and Portuguese in the south-west; the Provençal (*langue d'oc*) and the French (*langue d'oil*) in the north-west. (Modern written French was formed from the dialect of the Ile-de-France, the old Duchy of Francia.)

Sixthly, the Celtic group. The oldest records of the original language of any value (for Greek and Roman records are practically valueless) are found in glosses and interlinear versions of Irish ecclesiastical writers, and date from near the end of the eighth century. But even at that stage the Celtic showed signs of decay. The Old Irish is the best of all the Celtic languages, and appears to stand nearest to the original. Modern Celtic is divided into two groups—the Irish division, which includes modern Irish, Gaelic, and Manx; and the Cymric, including Welsh, Cornish, and Bas Breton, or Armorican. (Of these the Cornish is now a dead language.)

Seventhly, we have the Slavonic group. Here also the original language is lost; but the Old Bulgarian, which we have in MSS. dating from the eleventh century, is near the original language in most of its forms. On the contrary, the modern Bulgarian is the most lawless of all Slavonic languages. Servian is one of the oldest of Slavonic dialects: it can be traced back to the ninth century. Croatian is a dialect of Servian. We have a record of the Slovenian dialect (now spoken by the Slavonic inhabitants of Carinthia,

* "Outlines of a History of the German Language." By H. A. Strong and Kuno Meyer. Sonnenschein & Co., London.

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Styria, and Carniola) dating back as far as the tenth century. Russian and Little Russian (a distinct dialect) can be verified as far back as the eleventh century. Those are the Eastern Slavonic dialects. The Western are the Polish, Czech or Older Bohemian, Modern Bohemian, and Sorabian or Wendish.

Eighthly, the Lithuanian group. The oldest records of the Lithuanian language date no further back than the middle of the sixteenth century. Old Prussian, which was nearly related to Lithuanian, is now dead, having been replaced in the latter half of the seventeenth century by German. Lithuanian is dying out south of the Niemen, where it is called High Lithuanian; but Low Lithuanian, north of the Niemen, remains. Lettic, spoken in Courland and Livonia, is a younger form of Lithuanian.

Lastly, we have the group to which our own language belongs—the Teutonic languages. The original form of the Teutonic language cannot now be ascertained, Gothic being the nearest representative of that language of which records remain.

"Of all the Teutonic languages," remark our authors, "the Gothic, speaking generally, presents the most ancient characteristics, and in fact approaches most closely to the original Teutonic language. The Gothic language enables us to draw the most trustworthy conclusions as to this original language. Of all Teutonic languages it alone still retains the medio-passive forms common to the Greeks, the Indians, and the Eranians, forms which the Letts and the Slavs have completely lost. Again, it alone has preserved in its entirety the perfect reduplication, and it alone still maintains in their least crippled form the grammatical terminations of the old language. But true as Gothic has in the main been to the primitive type, it has still lost many forms which other German stocks, notably the Old High German and Old Norse, still possess—a sufficient proof, among others which might be cited, that neither German nor Norse can possibly be descended from Gothic; both of these languages have retained single heirlooms, inherited from the common mother, in a greater state of perfection than the Gothic heiress-in-chief." Almost our sole knowledge of Gothic is derived from the translation of the Bible by the Gothic Bishop Vulfila, better known by the Greek form of his name Ulfilas. He lived from 311 to 381 A.D. A few scanty fragments of Gothic exist outside that work. The Gothic language died and left no issue, so that it is in a truer sense dead than Latin and Greek. As is well known, the Goths employed the Runic alphabet, which was derived from the Roman.

Old Norse is known not only by the written literature which has existed since the twelfth century, but by ancient Runic inscriptions. A peculiarity of the Norse shows itself in the earliest inscriptions—the change namely of final *s* (voiced, or *z*) into *r*. Thus, in the "Golden Horn," we find for *gastiz*, Gothic *gasts*, a "guest," the form *gastir*. In 1397 Danish became the language of the better sort in Norway, and Norse split up into many dialects.

Old Saxon exists in the "Hêljand," an alliterative poem about Christ, and in some unimportant records. The Frisian, Franconian, and High German are the nearest neighbours to the Old Saxon. Middle Low German is found in many writings, but has no literature. New Low German, or Plattdeutsch, possesses a literature of modern date only. Of Low Franconian, spoken on the Lower Rhine, the oldest record is found in the Franconian glosses on the Salic code, written in Latin in the Malberg (Mahal-berg, or "Mount of Justice"). Then we have High Dutch, Middle Dutch, New Dutch (including Dutch Proper, Brabantian, and Vlamisch), the Frisian, the Anglo-Saxon (Old and New), and lastly English.

Our authors treat specially, of course, of the High German language, respecting whose history they give many curious particulars. (The chapter on popular and forgotten etymologies is singularly interesting.) Every one who cares for the philology of languages as compared with mere grammar and vocabularies will enjoy this work immensely.

AMERICANISMS.

(*Alphabetically arranged.*)

By Richard A. Proctor.

Caboodle. See "Boodle."

Caboose. The last car of an American luggage-train. Sometimes used for *Calaboose.*

Cache. A hole in the ground for hiding provisions. (French.)

Cachunk, or *Kerchunk.* With a noise or thump.

Calaboose. The common gaol.

Calculate. Used like "guess," especially in New England. I have occasionally heard "cal'late," as in the "Biglow Papers."

Camp-meeting. See *Big meeting.* An American way of advertising religious character.

Candidacy. Bad English for "candidature."

Cañon. (Sp.; pron. Canyon.) A narrow passage cut by rivers between precipices.

Canuck. A Canadian.

Canvas Back. A wild duck, found chiefly in Chesapeake Bay, of excellent flavour, but somewhat overpraised in America.

Car. A railroad carriage.

Carpet Baggers. Unprincipled adventurers, who went south after the war between the North and South to feed on the substance of a prostrate people. General Wade Hampton correctly employed the synonym "thief."

Carry Guts to a Bear. An expression much used in America to express worthlessness. But it is of early English origin. "He said you wern't fit to *carry guts to a bear*," said an English servant (long before the Irishman) to his master. "Well, and what did you say?" angrily asked his master. "I said you *were*," indignantly replied the man.

Catawamptious. Fiercely eager. A ludicrous monstrosity, says Mr. Bartlett, of the South-Western States. Probably a gift from the coloured folk.

Catch on to. Verb. To catch on to a plot or plan is to seize the idea of it.

Catfish. A favourite fish in America, offensively called a Siluroid by European naturalists. It is called also the Horned Pout, Bullhead, Minister (!), and sometimes simply the Cat. It is not beautiful.

Caucus. A private meeting of the leaders of a party, usually for some rascality, so that the term has an unpleasant sound in American ears.

Caution. Noun. A very striking warning. A "caution to sinners" means something appalling. We also often hear of a "caution to snakes," which sounds idiotic.

Cave. To "cave in" is to give way.

Cavort. Verb. To prance. Corruption from "curvet." Most American expressions of the sort are corruptions.

Chaw. To "chaw up" is to demolish. Probably derived from the American system of rough-and-tumble fighting, which includes biting or chawing as a legitimate way of discomfiting an adversary.

Checkers. The game of draughts.

Checks. Counters used to represent money or other kind of property. As in gambling a man passes in his checks at

the close of the play, a man is poetically said to "pass in his checks" when he dies.

Chemiloon. A "combination" of chemise and pantaloon: a feminine dress. Dr. Mary Walker, lecturing on dress, said, "I wear suspenders, and I feel awfully good in my chemiloon." See *Bad*.

Chicken-fixings. Originally a chicken fricassee, now applied sometimes to any particularly fine arrangements, as distinguished from "common doings."

Child, This. Meaning "myself." Nigger American (very popular).

Chip in. Verb. To take part in proceedings originally started by other folks. "They was taking Sam Willing to pieces like—Sheol—so I chipped in, and I says——" but what he said is too profane to be quoted.

Chipmunk. The striped squirrel.

Chivaree (Fr. *Charivari*). When an elderly man marries a young girl, it is a pleasing custom in Louisiana, Missouri, and other States of the West and South-West, to serenade the newly-married couple with bells, kettles, horns, and whatever will make the most discordant uproar. The respect shown by Americans to the fair sex is remarkable.

Chop. First Chop means first class. The expression is borrowed from the Chinese.

Chowder. A dish of fish, pork, onions, and biscuit.

Chunk. A short thick object; originally a piece of wood. The term is used in its original sense in England. But in America they talk of a chunk of a man, or even a chunk of poetry.

Chunky. Short and thickset. A chunky man is a short, fat person.

Cimlin. A squash.

Cincinnati Oysters. Pigs' feet.

Circumstance. A trifle. "K is a big man, but he's not a circumstance to Mrs. B.: it takes two men and a boy to see her all at once."

City. A small village.

Claim. A place marked out as some one's property.

Claim. Verb. To assert. "J. claimed to be unable to pay."

Clam. Certain shell-fish are called clams, as the hard clam (*Venus mercenaria*), the soft clam (*Mya arenaria*).

Clam Bake. Clams baked in the earth.

Clam Chowder. See *Chowder*, and include clams in the dish.

Clean Thing, The. What is right. "A low expression," Bartlett says: I venture to differ from him.

Clear Grit. Honest courage.

Clearing. A piece of land cleared for cultivation.

Clear Out. Verb. To get away. Sometimes used without the preposition, "Gentlemen, will you please clear, is American for "Get out!"

Clever. In American this word usually means well disposed and good-natured. An English lady, told in America that a girl was "clever but not smart," thought she had found just the kind of help she wanted, handy but not dressy; she found the girl kindly but stupid.

Cleverly. Neatly and well, as in English; but also pleasantly.

Coasting. Sliding down a snow-covered hill: a method of breaking limbs very popular in America.

Cobbler. A drink made with wine, sugar, lemon, and pounded rice, imbibed through a straw.

Cocktail. A stimulating drink made of spirits, bitters, sugar, and a suspicion (very vague) of water.

C. O. D. Collect on delivery. Often used as a colloquial expression.

Codding. Playing the fool.

Colonel. A title applied in America, especially in the south and west, to any one who has taken any part in military or military matters; also to many who have not.

Collect. Verb. "To collect" is used short for to "collect payments."

Collide. To come into collision. Used by Dryden and Burton.

Come. To "come it over anyone," is to get the better of him. To "come it strong" is to act or speak vigorously. The expression is often used in England.

Common Doings. Ordinary commonplace fare. See "Chicken-fixings."

Conceit. Verb. To think; to take a fancy or conceit.

Conductor. The conductor of an American train corresponds to our guard, but has a more responsible position, and considerably more self-respect.

Confidence. The Confidence Trick. Bartlett innocently confides in the story that the confidence trick was first played a few years ago in New York. It is hardly necessary to say that it is at least a century old in England.

Connection. "In this connection." A New England phrase for "in connection with this subject."

Conniption Fit. A feminine expression, apparently equivalent to a "fit of hysterics."

Considerable is often used in America as equivalent to "a good deal." Thus "he is considerable of a judge" means he is quite a judge. Also "considerable" is used as an adverb, "considerable smart" for tolerably smart, and so on. English is spoken with considerable of a change in the United States, but is supposed (there) to be considerable correct.

Continental. This word was frequently used for "colonial" in the time of the War of Independence.

Contrabands. At that time negro slaves were called "contrabands," because treated as contraband of war. The same word was used (and mistakenly supposed to have been invented) during the war between the North and South.

Contraption. A contrivance.

Cookery. A little cake.

Coon. A raccoon. Also a member of the old Whig party. A chap. A "gone coon" is a man whose case is hopeless.

Coon's Age. A coon's age means a long time. Vague.

Coot. A small waterfowl. A silly person. Also equivalent to our Cockney word "cove."

Copperhead. A kind of snake. The term was pleasantly applied in the North to Northern sympathisers with the South. Irving applies it to the Dutch colonists.

Corduroy Road. A road made by laying logs side by side over swamps.

Corn in America always means Indian corn or maize. What we call corn in England they call grain in America.

Corn Cob. The spike on which the kernels of corn grow.

Corn Cracker. A Kentuckian.

Corn Juice. Whisky.

Corner. A corner is the purchase of a larger amount of any kind of stock than is really in the market.

Corner Lot. A house or building at a corner of a block.

Corral. A pen for securing cattle.

Cotbetty. Equivalent to the old English cotquean—a man who meddles in women's business.

Count. To reckon (used like "guess" and "calculate").

Cowboy. A cattle-herder in Texas and the Far West generally. Used also generally for low ruffians or rowdies.

Cow-catcher. A contrivance for clearing animals out of a train's way.

Coyote. The prairie wolf.

Cracker. What we call "biscuits" they call "crackers" in America. See *Biscuits*,

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Cradle. A machine, like a cradle in shape, used in washing out gold-dust. Also called a rocker.

Crank. Adj. Fanciful (also *Cranky*). Noun. A fanciful person.

Crazy. Used where we say "mad." Crazy seems never used in America to mean shaky.

Creole. Strictly, one born in America of European parents. In Louisiana and elsewhere down South they apply the term to any native productions, so that we hear of *creole* cattle, *creole* cabbages, and so forth. In New Orleans the term *creole* is limited to persons of pure French extraction, so that Mr. Cable's mistake in applying the term to mulattos and quadroons has given great offence there.

Crescent City. New Orleans.

Crevasse. An opening in the levees on the Lower Mississippi.

Crowd. Used for "company," this word is purely American. "He called for liquor for the crowd," meaning for the whole company. Also used as a verb where we should say *squeeze; e.g.* to *crowd* a person's hand affectionately.

Crower. Like "rooster," for *Cock.*

Cruel. Used adverbially for "very."

Cunning. A feminine word for anything small and pretty, or taking. A lady comforted me when the news reached me in America that twins had been born to me in England, by saying that twins are always so "cunning."

Curious. Yankee for particularly fine. As curious cider, for singularly good cider.

Cuss. This word is used sometimes for "curse," and sometimes for "customer."

Cussedness. Perversity.

Cuss-words. Oaths.

Cutting Didoes. Playing the fool; cutting capers.

Cute. Keen. Also used like "cunning," for quaintly pretty, or simply quaint.

Cutting it fat. Overdoing anything, especially applied to flattery. Cockney, also.

Cut up. To be riotous. "Oh, heart! stop cutting up," a curiously poetical way of saying, Cease beating so violently. "Cutting up shines" is equivalent to "cutting capers" in English.

Dander. This word is really short for Dandruff. To get one's dander raised, or riz, is to be put in a passion. The hair is supposed to stand on end with rage, as with fear; and the hair rising might be supposed to raise the scarf at the hair's roots. So there is poetry here also.

Danites. Men whom the Mormons are said to employ to kill the enemies of the Mormon faith.

Dark and Bloody Ground, The. A name applied to Kentucky, the battle-ground between Northern and Southern Indians and afterwards between the Indians and the first white settlers.

Darky. A negro.

Dark o' the Moon, or *Dark Moon.* Short for "Darkening of the Moon," the time from full moon to new moon.

Darsn't, for *Dares not.* As commonly used in America, Darsn't appears to be conjugated thus—I darsn't, (thou darsn't), he darsn't, we darsn't, you darsn't, they darsn't.

Dead-Beat. A mixture of ginger, soda, and whisky taken at the close of a long carousal. Also, see *Beat.*

Dead-heads. Persons who travel, drink, or go to places of entertainment without paying.

Death. To be death on anything is to be a sure hand, as we say in England. The expression, no doubt, had its origin among hunters.

Deck. A pack of cards. Used by Shakespeare, 3rd part of "Henry VI.," v. 1.

Decoration. A day, generally towards the end of May, appointed for decorating tombs of soldiers and sailors who fell in the war between the North and South, or of politicians who were active during that war.

Deed. Verb. To transfer by *Deed.*

Deestrick. An American way of pronouncing the word "district." It is not *the* American way, of course.

Depot. Fr. Pronounced *dee'po.* A railway station; always so understood unless accompanied by a word defining the depot differently, as *provision deepo,* &c.

Dessert. Fr. This word, which really means fruit or whatever is eaten after the dinner itself has been cleared away (*desservi*), is often applied in America to pastry. It is sometimes pronounced de'sert. Better perhaps to be wrong all round than half wrong half right.

Dicker. Verb, to barter. Noun, barter.

DEATH CUSTOMS OF THE INDIANS.

By "Stella Occidens."

WE have observed the care with which the Otoe and Missouri Indians preserve the body from being touched by the earth: the Comanches of Indian territory go to the opposite extreme. "When a Comanche is dying, while the death-rattle may yet be faintly heard in the throat, and the natural warmth has not yet departed from the body, the knees are strongly bent upon the chest, and the legs flexed upon the thighs. The arms are also flexed upon each side of the chest, and the head bent forward upon the knees. A lariat, or rope, is now used to firmly bind the limbs and body in this position. A blanket is then wrapped around the body, and this again tightly corded, so that the appearance when ready for burial is that of an almost round and compact body, very unlike the confused pall of his Wichita or Caddo brother. The body is then taken and placed in a saddle upon a pony, in a sitting posture, a squaw usually riding behind (though sometimes one, on either side of the horse) holds the body in position until the place of burial is reached, when the corpse is literally tumbled into the excavation selected for the purpose. The deceased is only accompanied by two or three squaws, or enough to perform the little labour bestowed upon the burial. The body is taken due west of the lodge or village of the bereaved, and usually one of the deep washes or heads of cañons, in which the Comanche country abounds, is selected, and the body thrown in, without special reference to position. With this are deposited the bows and arrows; these, however, are first broken. The saddle is also placed in the grave, together with many of the personal valuables of the departed. The body is then covered over with sticks and earth, and sometimes stones are placed over the whole. The best pony owned by the deceased is brought to the grave and killed, that the departed may appear well mounted and caparisoned among his fellows in the other world. Formerly, if the deceased were a chief or man of consequence and had large herds of ponies, many were killed, sometimes amounting to 200 or 300 head in number."*

An amusing story is told in illustration of the importance attached to the pony provided for the deceased in the happy hunting-grounds. An old chief died who was very poor, and had no friends or relations. The people thought

* Account given by Dr. Fordyce Grinnell, of Wichita Agency, Indian Territory, Bureau of Ethnol., p. 99. First Annual Report 1879-80 (Smithsonian Institution).

that any kind of a pony would do for him, so an old, dilapidated, lop-eared scraggy pony was killed at his grave. However, to their great astonishment, he returned a few weeks later on the same old pony, and he was worn out with hunger and fatigue. When the men of his tribe saw his hollow cheeks and sunken eyes they fled from him in consternation. He begged for food, and one bolder than the rest offered him a piece of meat on the end of a lodge-pole. When he appeared at his own camp, the Comanches and Wichitas fled in dismay to a place on Rush Creek. "When the troubled spirit from the sunsetting world was questioned why he thus appeared among the inhabitants of earth, he made reply that when he came to the gates of Paradise the keepers would on no account permit him to enter upon such an ill-conditioned beast as that which bore him, and thus in sadness he returned to haunt the homes of those whose stinginess and greed permitted him no better equipment. Since then no Comanche has been permitted to depart with the sun to his chambers without a steed which in appearance should do honour alike to the rider and his friends.'*

The body is buried on the western side of the camp, that "the spirit may accomplish the journey to the setting sun beyond." It is supposed among the Comanches that the spirit starts on its journey the following night.

Among the mourning observances of the Comanches are many strange customs differing from those of other tribes. Instead of the property of the deceased being disposed of among the relations, it is all destroyed or buried in the ground. It is believed that when the goods are burnt they ascend to heaven in the smoke, and will thus be of service to the owner in the other world. "Immediately after death, the relatives begin a peculiar wailing, and the immediate relatives of the family take off their customary apparel and clothe themselves in rags, and cut themselves across the arms, breast, and other portions of the body, until sometimes a fond wife or mother faints from loss of blood.† This is also customary among the Dacotah Indians. A missionary at Fort Snelling related the story of a woman who had lost a brother. With her friends she set up a most piteous crying, or rather wailing, which continued during all the night. She would keep on repeating the words which in English would mean, "Come, my brother, I shall see you no more for ever." Next morning preparations were made for the ceremony of cutting their flesh. The thermometer was at ten to twenty below zero, and the snow lay thick on the ground. However, a space was cleared, in the centre of which a very small fire was kindled, not so much for warmth as to cause a smoke which would ascend to the land of the setting sun. The sister and three other women came out of her lodge barefooted, and nearly naked, and all three began wailing and crying. They cut their knees and ankles with sharp stones, and one poor woman made more than a hundred gashes in her flesh. She was thoroughly exhausted with pain, loss of blood, cold, and long-continued fasting, and soon she sank on the frozen ground, shivering from the cold, and moaning with pain. She appeared frantic with grief; but it is not easy to imagine what benefit she expected for herself or her dead brother in return for this self-inflicted torture.‡

I may quote in conclusion the following translation of Schiller's burial song, believed to have been written by Bulwer:

See on his mat, as if of yore,
How life-like sits he here,
With the same aspect that he wore
When life to him was dear.
But where the right arm's strength, and where
The breath he used to breathe
To the Great Spirit aloft in air
The peace-pipe's lusty wreath?
And where the hawk-like eye, alas!
That wont the deer pursue
Along the waves of rippling grass
Or fields that shone with dew?
Are these the limber, bounding feet
That swept the winter snows?
What startled deer was half so fleet?
Their speed outstripped the roe's.
These hands that once the sturdy bow
Could supple from its pride,
How stark and helpless hang they now
Adown the stiffened side!
Yet weal to him! at peace he strays
Where never fall the snows,
Where o'er the meadow springs the maize
That mortal never sows;
Where birds are blithe in every brake,
Where forests teem with deer,
Where glide the fish through every lake,
One chase from year to year!
With spirits now he feasts above;
All left us, to revere
The deeds we cherish with our love,
The rest we bury here.

* First Annual Report, Bureau of Ethnology, Smithsonian Institution, 1879–80, p. 100.

† *Ibid.*

‡ Neil's "History of Minnesota," p. 445.

FIGURE OF THE MILKY WAY IN SPACE.

By Richard A. Proctor.

NINETEEN years ago* I wrote a paper called "Notes on Star-streams," in which I discussed the relations presented by the Milky Way, looked upon as in reality a star-stream and not the mere projection on the celestial sphere of a widely extended disc of stars. I endeavoured to show that although Sir W. Herschel's view respecting our galaxy was perhaps the only one which he was justified in forming when prosecuting his celebrated star-gaugings, it is yet one which is far from being in accordance with the information which he himself gathered for us, and is still further opposed by the facts which Sir John Herschel observed during his survey of the southern heavens. And I dwelt in particular on the evidence which the strange convolutions of the Milky Way, its narrow necks or isthmuses, the knots or clustering aggregations upon it, and still more the circular gaps which pierce it, afford respecting its structure. These point to the conclusion that whatever the Milky Way may be, it is certainly not what Sir W. Herschel had supposed. But I was forced at that time to admit that the problem of suggesting the real configuration of our galaxy was more than I could manage. Its complexities seemed unintelligible; though I did not wholly dismiss the hope of discovering a tolerably simple solution of the difficulties which presented themselves. "I may, perhaps," I remarked, "return on some future occasion to the consideration of the subject." When I thus wrote I was in hopes that the apparently intractable windings of the galaxy, as exhibited to us in the drawings of Sir John Herschel, would have been long ere this reduced into something like order.

* "Intellectual Observer" for August, 1867. This paper was written, however, seventeen years ago. I found it along with the letters of Sir John Herschel published in the first and third numbers of the present series of *Knowledge*. The paper and the illustrations appeared to me worth preserving in connection with Sir J. Herschel's letters.

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For I must admit that it seemed to me as though our astronomers had been wilfully increasing the difficulty of the problem by the perverse way in which they had chosen to regard it. It was well fitted to the noble genius of Sir Wm. Herschel to take a wide view of the sidereal scheme. Indeed, standing where he did when he first attacked the problem, he had no choice but to select the more obvious and general features of the stellar scheme for his consideration. But as he progressed with his work he gradually began to modify many of the views which he had formed when the work was commencing. Or rather I should perhaps say that he began to test the general principles on which he had been compelled to base his inquiries. And there are few more interesting subjects of study than the gradual progress by which our great astronomer made his way from one point to another, until towards the end of his life he seemed preparing to lay before the world views which, while the direct fruits of his earlier hypotheses, were yet altogether opposed to them.

The work which the elder Herschel has thus carried so nearly to its completion fell into no unworthy hands. Sir John Herschel, inheriting his father's grand powers of generalisation almost undiminished, possessing also a capacity for laborious and far-sighted observation altogether equal to his father's, and a more thorough acquaintance with mathematical modes of reasoning, seemed capable of pushing the theories of the universe to that point which I believe they would most certainly have attained had Sir Wm. Herschel lived a few years longer.

But there was, I think, a difficulty in the way. The feeling I have when I rise from the perusal of any of those noble passages in which the younger Herschel presents or discusses the views formed by his father is, that he has been at times prevented from prosecuting inquiries which seem opposed to the general direction of his father's researches, by a feeling—very natural and amiable—of respect for his father's work and fame. I could point to many passages which seem to me to force this view upon us, but I will content myself with noticing two singular illustrations.

Sir John Herschel is describing the configuration of the Milky Way in the southern heavens. He has occasion to speak of the striking brightness of the galaxy in the southern skies. Now it need hardly be remarked that on Sir W. Herschel's theory of the galaxy this great brightness is very difficult of explanation. That this is so, in fact, is proved by this, that, whereas Sir John Herschel felt that we could only explain the phenomenon naturally by supposing our sun to be nearer this part of the Milky Way, Professor Grant points out (very justly) that on Sir William Herschel's theory the phenomenon requires that the sun should be nearer to the opposite part of the Milky Way, for on this supposition alone would the number of stars towards the south be greatest. Sir John Herschel gives the obvious explanation, however; and he seems to feel how strongly it is opposed to his father's theory, for he adds that the galaxy "*on this view of the subject would come to be considered* as a flat ring of immense and irregular breadth and thickness, within which we are eccentrically situated nearer to the southern than to the northern part of its circuit." Yet he nowhere adopts this view. I feel certain that had the disc theory of the galaxy been due to any but Sir W. Herschel, the observation would have led the younger Herschel to adopt at once and finally the ring theory, though I believe he would soon have seen reason to modify his opinion of the ring's shape and figure.

Again, Sir John Herschel is discussing the Magellanic clouds. He is impressed with the evidence they seem to afford of the fact that, within very moderate limits of distance, the faintest telescopic stars and nebulæ of all degrees of irresolvability may be mixed up with stars of the eighth and ninth magnitude. Nay, he points out in his own lucid manner that, according to all the laws of probability, we must look on this fact as established beyond dispute. He sees also, as in the preceding instance, that this view is altogether opposed to accepted views respecting the universe. Yet he closes the discussion of the overwhelming evidence thus afforded against one of the most striking of his father's views with the simple remark that, "It might lead us to look with some doubt on conclusions which in former pages of this work have been somewhat positively insisted upon." A certain fact is proved beyond all question, yet in the remaining pages of the "Outlines of Astronomy" that fact is completely ignored.

Even as it is, Sir John Herschel's views respecting the galaxy are marked by a certain advance upon his father's. Although not definitely adopted, we must look on the ring theory of the Milky Way as that which the younger Herschel held in preference to the disc theory.

Now, it will be noticed that wherever Sir John Herschel has occasion to refer either to the narrower portions of the galaxy or to the branches which appear to extend from it, he always exhibits a preference for the view that these narrow star-beds are in reality the side views of widely extended star-strata. He says, indeed, in one place, speaking of a region where several branches of this sort are visible, "it is obviously more reasonable to suppose that these are sheets of stars viewed edgewise, than to imagine they are real columnar excrescences, bristling up from the general level."

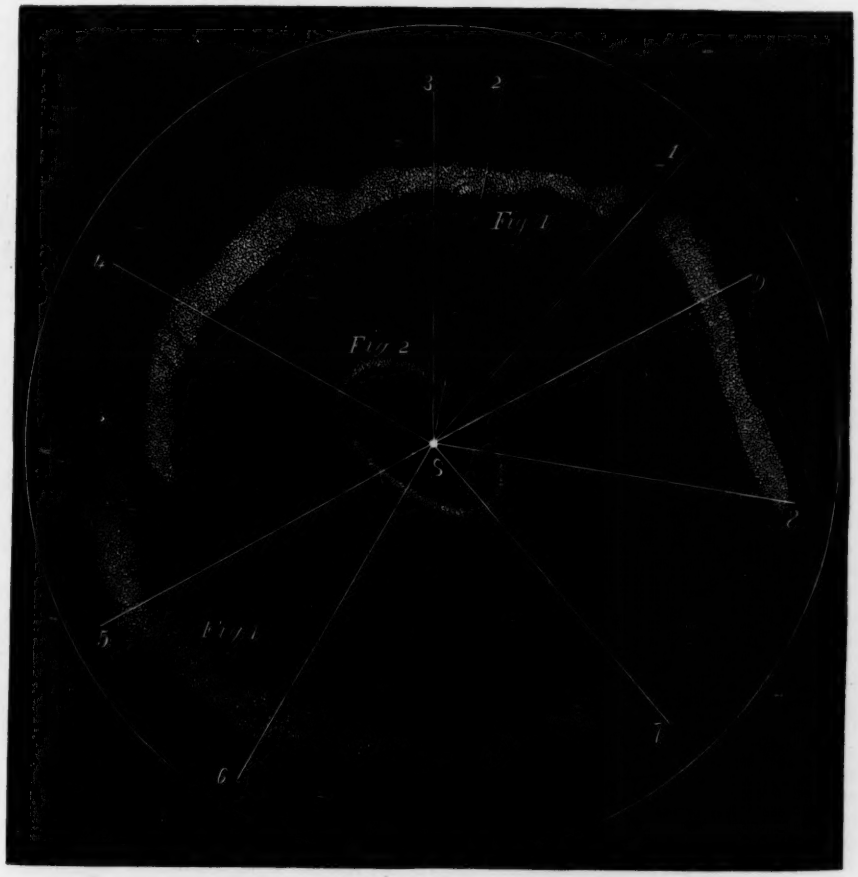
I think we must recognise in this peculiarity the influence of the preconceived opinion that not merely our sidereal system but all the parts of it exhibit a certain tendency to lateral extension, so that the existence of a columnar star-group, or of what I should prefer to call a star-stream, is improbable *à priori*. Otherwise, I confess I am unable to conceive how his intimate acquaintance with the principles of probabilities could have failed to enforce upon Sir John Herschel the feeling that the many long and narrow streams which he saw extending from various parts of the galaxy must in most instances, if not in all, be *columnar*. Nay, even with preconceived views rendering the estimated chance of the existence of galactic star-streams only $\frac{1}{100}$, yet the existence of two such streams would have balanced that *à priori* improbability, since we can hardly estimate at more than $\frac{1}{10}$ the chance of a sheet of stars being seen edgewise, and therefore the chance of two being so seen would be only $\frac{1}{100}$. Now, Sir John Herschel saw *many* such excrescent streams.

It will be seen at once that the existence of small streams extending from the galaxy goes far to prove the stream-formation of the galaxy itself. When this evidence is added to that which I adduced in my former paper, the conclusion seems to me to be altogether obvious that the apparent stream of milky light which we term the galaxy is in reality a stream of small stars, surrounding us on all sides.

But I would go further, and assert that the naked-eye appearance of the Milky Way is sufficient evidence on which to ground the belief that there is a distinct ring of matter out yonder in space, and that this ring is not flattened, as Sir John Herschel thought, but is (roughly speaking) of nearly circular section throughout its length. I conceive that nothing save the perverse way in which astronomers have chosen to deal with the phenomenon would ever have led them to forget the evidence of their senses in this matter. Of course, if we insist on taking the average number of stars visible on a certain space of the heavens as indicating the density of the stars over that space, although it is perfectly obvious to the eye that there is a distinct and systematic

arrangement of the stars there wholly negativing our initial supposition, we must expect to be misled. With all respect for the elder Struve's labours, I must admit that this seems to me to be what he has done in his famous distribution of the stars according to zones of given galactic polar limits.

Consider, however, fig. 1, which represents the galaxy as actually seen in the heavens,* and it becomes wholly impossible to believe that we have to deal with the projection upon the celestial sphere of a widely-extended cloven disc of stars. The view does not account for *one* of the peculiarities of the galaxy proper, however justly it may seem applicable to the sidereal system. The great break in Argo (opposite line 1 in our figure) is of itself sufficient to negative the disc



theory; so is the coal-sack near Crux, and so are the somewhat similar vacancies in Cygnus and Argo. The fact, too, that the second stream (which has led to the assumption that the sidereal disc is cloven) is not continuous, is one which cannot possibly be explained on the disc theory.

But, although one may feel convinced that the galaxy is really a stream of relatively small stars surrounding our heavens, it has always seemed to me a very difficult matter to account for the various phenomena presented by the Milky Way on any reasonable hypothesis. It was easy to see that, whatever hypothesis we adopt, we must be prepared to admit of the existence of great irregularities. In fact, as such a stream as I conceive the Milky Way to be would be subject to a number of attractions, swaying its length here in one direction, there in another, those irregularities were to be looked for independently of any considerations founded upon the observed appearance of the Milky Way. But there were certain features which I felt that any hypothesis for which support could reasonably be claimed ought to explain.

The difficulty I found was in conceiving how, first, the *interruptions*, secondly, the *variations of brilliancy*, and thirdly, *lacunæ* in the Milky Way, could be accounted for by any single stream however shaped. An explanation, which accounted for the interruption opposite line 1, left the interruption opposite line 2 unaccounted for. Again, I did not find it easy to account for the sudden access of brilliancy at 8, the extreme faintness at 7, or the fact that of the two branches starting from 5 the fainter becomes presently the brighter, and *vice versâ*. The three coal-sacks also were a great mystery to me.

I have again and again attacked the problem (which now seems perfectly simple and easy) without being able to imagine a stream of reasonable figure which would account for these peculiarities.

At length (more than two years after I had come to the conclusion that the galaxy is really a spirally formed ring of generally circular section, by looking on the break opposite

* The mode of projection must be conceived to be as follows:—Suppose that on a celestial globe a band is taken, including the whole of the Milky Way, and that this band is spread as a long, straight slip on a plane surface. If, then, we conceive the band turned into a circular strip, from the uniform contraction of one edge, we shall have such a map as fig. 1.

as due to increase of distance, not to a real interruption of continuity, I was able to construct a single spiral curve which seems completely to meet all the requirements of the problem. This curve is exhibited in fig. 2, which is supposed to exhibit the actual figure of the galactic spiral in space. It is so situated that the various lines drawn from our sun, supposed to be at S, intersect the various portions of the figure representing the real galactic stream, opposite the regions in which these lines meet the figure of the galaxy on our heavens.

We see that line 1 passes through a gap between the two loops of the galactic spiral. This seems (to begin with) a simple explanation of what has hitherto been admitted to be one of the most perplexing features of the Milky Way. Passing to position 2 the line crosses two branches of the curve, and the coal-sack is accounted for by the deviation of one branch (or both branches) slightly from the mean galactic plane. From position 3 the line crosses one branch at a very small distance, the other being much farther off. This corresponds closely with the appearance of the two branches, the continuous one being very much the brighter, and some portions along this part of its length being described by Sir John Herschel as singularly bright. It is also well worthy of notice that the two stars which are nearest to the sun (so far at least as observation has yet shown) lie along this branch of the galaxy—α Centauri very nearly where the branch approaches closest to the sun, 61 Cygni in direction S5, where the branch is some three times farther off.* The farther branch attains, along S4, so great a distance from the sun as to become invisible. This corresponds with the *mode* of the discontinuity of this part of the Milky Way, for each end of the broken division *loses itself*, not terminating abruptly like the two fan-shaped terminals opposite the line S1.

Near this portion of the circuit we are provided with an explanation of what had always been looked upon as a great difficulty. Where the two branches start from the coal-sack in Cygnus (on S5), the northern branch is much the brighter, but presently the northern branch grows fainter and ultimately vanishes, while the southern grows brighter and brighter. This is fully accounted for by the figure I have assigned to the spiral.

The projection at 6 may be accounted for by assuming the end of the spiral to be curved backwards as I have shown it.

Lastly the faintness at 7, the projection at 8, and the vacuity at 9 are obviously accordant with the figure given to the end of the spiral which falls opposite the lines to these parts.

Without asserting that the actual figure of the galaxy in space is that shown in fig. 2, I yet think it probable that the order of its windings resembles that shown in the figure. I believe, however, that there are many irregularities not merely in the direction in which the spiral extends through space along its general plane, but in directions inclined to that plane. The appearance presented by the Milky Way in Aquila and Scorpio is strongly suggestive of such peculiarities in the real figure of the spiral.

I feel convinced, further, that the study of the Milky Way as presented in fig. 1 will at once dispose of the notion that the galaxy can be either a cloven disc or a flat ring, or that the section athwart any branch of it can be otherwise in general than roughly circular.

"The fool hath said in his heart, there is no God." It takes another kind of fool to add, "except my God." The wise alone know that "a God understood would be no God at all."

* According to the annual parallaxes assigned to these stars, 61 Cygni is between two and three times as far from us as α Centauri.

ANIMAL WEATHER-LORE IN AMERICA.

By Charles C. Abbott, M.D.

HAPPILY there still remain a few of those great, cavernous, open fireplaces, flanked by high-backed settles, whereon the young people love to lounge while their elders, resting from the day's labours, talk drowsily of old times, recount the adventures of their youth, and repeat the tales of their grandfathers. As one of such young people I have passed many long winter evenings listening eagerly to what the septuagenarians might relate, and occasionally venturing a question or two that more light might be thrown upon obscure portions of remarks made at the time. Then, particularly, are we likely to hear much of that very curious animal weather-lore that for the past two centuries has been handed down from father to son. Time and again, as the weather chanced to be discussed, I have heard some uncouth rhyme repeated, usually prefaced with the remark, "You know the old saying."

That all animals are more or less affected by coming atmospheric changes is unquestionable. This simple fact has been recognised the world over, but, unlike many other simple facts, has not resulted in leading to any important discoveries. It has, however, given rise to the innumerable sayings to which I have referred.

Inasmuch as the animal weather-lore current in England and Sweden dates far prior to the settlement of this country by the Swedes and English, it would seem probable that such sayings as now are or recently were current in South and Central New Jersey are merely adaptations of English and Swedish weather-lore to our fauna, just as the European names of the commoner birds found there were applied to those American species most closely resembling them; and so any rhyme or brief saying referring to them would be applied to the analogous bird found here (in America). This is eminently reasonable, for if the given habit, voice, or other peculiarity of a European bird did, or was supposed to, indicate a given meteorological condition, the same rule should hold good in America. As a matter of fact, however, I can find no similarity between the English and Swedish and the American weather-lore, except such as applies to domestic animals; nor do I find any common English sayings in use.

That which I have heard, and have recorded from time to time, appears to have originated where [it is] now, or where it lately was, in use. To a great extent, I believe it to be original with the descendants of the immigrants that settled Central New Jersey and the country generally about Philadelphia; but a portion of it, very possibly, was derived from the Indians.

At present, a portion of this weather-lore is repeated as nursery rhymes, and it is due to this that it has been preserved to the present time; and, so far as I have been able to determine, not one of the rhymes or sayings has ever been published. That among the earliest papers and almanacs of the country there may be found some of them, or slightly different versions of the same, is probable, but my searchings therefor in the larger libraries have not resulted in any such discoveries.

The main interest, however, in connection with weather-lore is to determine whether the sayings do or do not correctly represent the relationship of the animals mentioned to the given condition of the weather. In other words, is the zoology of the weather-lore misrepresented or not? I am forced to declare that, as a rule, those who by virtue of their ingenuity framed these rhymes and brief sayings did not correctly interpret Nature.

Very many of the early English settlers were, no doubt, excellent observers; but they appear at times to have more desired to be looked upon as weather prophets than as naturalists, and strove to have glib nonsense-sayings pass current as evidence of their wisdom, instead of taking pains to correctly interpret the course of Nature and determine the relation of animal life to its environment.

Often during my rambles in the neighbourhood I have questioned the few remaining descendants of the original settlers concerning the local weather proverbs, and I find the impression is still prevalent that the purport of all these sayings is substantially correct, and therefore, to a great degree, that my neighbours are labouring under erroneous impressions. "Is there not wisdom in a multitude of counsellors?" they ask; and I, standing alone, am voted the fool, while they pose as sages.

Let us consider this weather-lore, bit by bit, as I have gathered it from time to time, and discuss its merits, if it possesses any, and also its absurdities.

Of such sayings as refer to our domestic animals, the following are the most noteworthy. Of the cow I have heard it said:—

> When a cow tries to scratch its ear,
> It means a shower is very near;

and again:—

> When it thumps its ribs with its tail,
> Look out for thunder, lightning, hail.

As is now pretty well known, a short time before a shower in summer there is often a highly electrical condition of the atmosphere which makes all animals more or less uneasy. Therefore the lashing of the tail, if not merely to brush away flies, may refer to this uneasiness, and so, too, the ears may be more sensitive than the general surface of the body. This is a probable explanation: but, after all, it is not proved that the cow at such a time suffers as much from it as is supposed; nor is it easy to see how the flagellation of a very insignificant part of the body can ease a painful sensation common to the entire surface. On the other hand, it is certain that flies and other troublesome insects are sensitive to atmospheric changes, even a slight lowering of the temperature, such as no mammal would appreciate; and for an hour or two before a shower, for this reason, they congregate in extraordinary numbers about animals—horses and cows particularly. I have thought that they seek the cows for warmth when the air suddenly cools; and is it not more than probable that the nervousness on the part of the animal, shown by frantic efforts to scratch its ears with its hind-feet and the lashing of its tail, has to do with the excess of irritation caused by innumerable flies, and not with any unusual electrical titillation? If so, the cow's action is still indicative of an approaching change in the weather, and so far may be claimed as a sign of such change, but the connection of the two facts is not such a one as is usually given. It is an indirect, not direct, indication of the prophesied rain-storm. But bearing heavily on the subject is the unquestionable fact that an unusual number of flies often suddenly make their appearance, and torment cattle almost beyond endurance, during the four or six weeks of drought which in summer, early or late, we are so sure to have. In such cases the signs fail. I have asked many a farmer how this could be, and the one reply that I have received in every case is that "there was a shower in the neighbourhood." It usually happened, however, that the neighbourhood was as parched as we were, and seeing the signs fail with them, they were covetous of the shower they supposed that we had had. Perhaps it is with such indications of changes in the weather as it has been said of autumnal proofs of the character of the approaching winter. Miles Overfield once remarked, "When the signs get to failin' 'long in the fall, there'll be no tellin' about the winter."

Of pigs, I have heard it said very frequently—

> "When swine carry sticks,
> The clouds will play tricks";

but that—

> "When they lie in the mud,
> No fears of a flood."

The first of these couplets is of twofold interest. I have watched pigs for years to see what purport this carrying of sticks and bunches of grass might have, and have only learned that it has nothing whatever to do with the weather, or at least with coming rain-storms. The drought of summer is so far a convenience as to throw light upon this habit, as it did upon the uneasy cows. Pigs carry sticks as frequently then as during wet weather, or just preceding a shower. Furthermore, these gathered twigs are not brought together as though to make a nest, but are scattered about in a perfectly aimless manner. For some cause the animal is uneasy, and takes this curious method of relieving itself. The probabilities are that it is a survival of some habit common to swine in their feral condition, just as we see a dog turn about half a dozen times before lying down.

In an interesting paper on local weather-lore, read by Mr. Amos W. Butler before the American Association for the Advancement of Science, during the Philadelphia meeting of 1884, the author has another version of this saying: "When hogs gather up sticks and carry them about, expect cold weather." This is wholly at variance with what I have observed, for my memoranda record this habit almost wholly during the hot weather, and this must necessarily be the rule with New Jersey swine, or the local weather-prophets would not have coined the verse as I have given it.

As to the other couplet, it is about as near meaningless as any saying can well be. Some rustic rhymer, a century ago, may have added it as a piece of fun, but it has stuck most persistently. As it stands now, it has stood for quite one hundred years.—*Popular Science Monthly.*

(*To be concluded.*)

THE RACES OF BRITAIN.*

THIS is what the seventeenth century writers would have approvingly called a "painful" book, as when Jeremy Taylor speaks in praise of Tostatus Ambulensis as "a very painful person and a great clerk." For the collection of the materials tabulated and illustrated in Dr. Beddoe's work has involved an appalling amount of labour, to which small hope of large recognition and speedy result could give impetus, but only the desire to lay the foundation for a scientific treatment of the profoundly interesting, but long confused, study of the ethnography of Britain.

The subject is even now not altogether out of the hands of the "fadicals." Despite Mr. Elton's scholarly and delightful "Origins of English History," Mr. Green's attractive but less authoritative "Making of England," and the more modest but accurate manuals prepared, at the instance of the Christian Knowledge Society, by Mr. Grant Allen,

* "The Races of Britain: a Contribution to the Anthropology of Western Europe." By John Beddoe, M.D., F.R.S., &c. Bristol Arrowsmith.

Professor Rhys, and others, there are still left enough eccentric people to support the "Anglo-Israel" craze, with its organs in advocacy of the descent of the British from the Lost Ten Tribes, and of the national lion as the equivalent of the Lion of the Tribe of Judah. Like the Ephraim with whom they claim kinship, such folk are "joined to their idols; let them alone."

The judgment of sound ethnologists that there are no pure unmixed races in Europe applies to these islands in marked degree, the history of their peoples being one of continuous intermingling, possibly, as Dr. Beddoe hints, from late palæolithic times, and certainly from earliest neolithic times, to this day. The Celts of Cæsar, the "ancient Britons" of our obsolete school-books, were not aboriginal; and perhaps the earliest historical reference to races preceding them as immigrants is in that of Herodotus to the Kynesii (which word, probably meaning "dog-men," may be the Greek equivalent for a totemic tribal name), as "dwelling the furthest away towards the west of the inhabitants of Europe," races leaving their mark in relics both material and intangible—in tomb and tumulus and superstitions miscalled "Druid," really the Shamanism of the west—and whose blood yet runs in the veins of swarthy men and women scattered over these islands, especially along their western shores.

Dr. Beddoe, dissatisfied with conflicting accounts of racial characteristics due to casual observation, and with the doubtful nature of evidence as to race-connexion based on the shape of skulls, has devoted the available leisure of over thirty years to measuring the heads, noting the colour of eyes and hair, and the stature and bulk (the details of these last-named not being included in the volume under review) of hundreds of thousands of people of both sexes, and of all ages and conditions of life, from John o' Groat's to Land's End, and has then compared his records with results obtained on the continent, especially among races having most in common with our own. The course of true inquiry does not always run smoothly, and even the promise of money sometimes failed to overcome the scruples of the owner of the head to submit to the measuring test. The natives of Kerry seem to have been especially obstinate, perhaps through superstitious dread akin to that which makes savages afraid of having their likenesses taken, and Dr. Beddoe tells by what ruse he and his comrades succeeded:—

> Whenever a likely little squad was encountered, the two archæologists got up a dispute about the relative size and shape of their own heads, which I was called in to settle with the callipers. The unsuspecting Irishmen usually entered keenly into the debate, and before the little drama had been finished were eagerly betting on the sizes of their own heads, and begging to have their wagers determined in the same manner.

Dr. Beddoe divides his work into sections corresponding to race movements in these islands, using with becoming caution the evidence which language and place names supply concerning the area and range of immigrations, all this being prefatory matter to the elaborate tables and maps on which his conclusions as to the several proportions of blonde and dark peoples are based. His scientific temper is shown in the "inconclusions" added to the final chapter.

Certainly the main interest of the book gathers round the question, hinted at above, of the persistent admixture of a Mongoloid element in Britain, an element of which the most notable indications are the oblique or Chinese eye with its almond-shaped opening, and thickness of the upper eyelid. Its presence is fatal to the easy-going theories of historians who have cleared the ground by assuming the extermination of conquered races, and a purely Teutonic element in English and Lowland Scots. It throws faint, yet welcome, light on the very obscure movements of prehistoric races across the Eurasian continent, whose semi-civilisation is the substratum, now and again obtruding or overlapping, of both Aryan and Semitic culture. Dr. Beddoe's work is therefore to be commended both to the ethnologist and the historian. The one will find its data indispensable in considering the influence of interminglings and consequent subtle variations before he determines his racial types; the other cannot ignore those data if he would satisfactorily explain the great race-movements which have affected the destinies of empires.

MARS AND JUPITER.

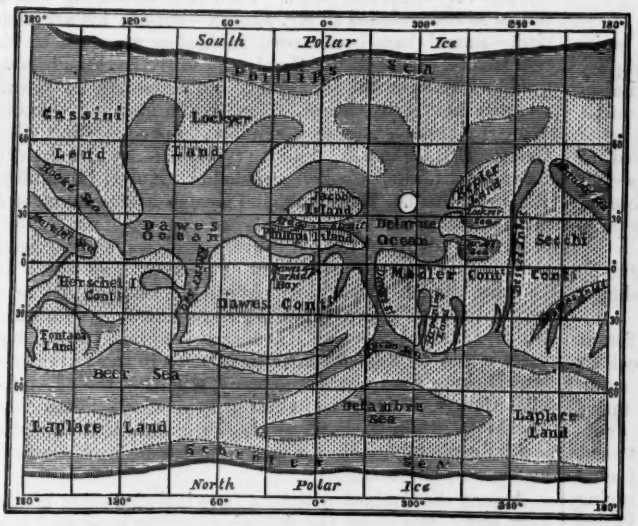
By Richard A. Proctor.

WE present this month four views of each of the planets which are now shining so conspicuously in our skies, besides a map of Mars and a separate view of Jupiter, showing the giant planet as he appeared before the recent remarkable phenomena in his southern hemisphere had shown themselves (or had returned?).

The two upper views of Mars show the planet as drawn by Mr. Trouvelot, at Harvard, in 1877; the two lower ones show Mars in nearly the same aspects, as drawn at the same opposition, by Mr. Nath. Green, at Madeira. It is hardly necessary to tell the reader that the present aspect of the planet is very different from that which Mars presented in 1877. The student will have no difficulty in applying the construction I gave in Knowledge for February 1, 1884, to obtain suitable projections of the meridians and parallels of Mars as now posed with respect to the earth; and, by filling in details from the accompanying map, he can obtain any number of projections of the planet itself. For the present I have not thought it necessary to alter the map to correspond with the improved nomenclature suggested by Mr. Green. As the names I gave the continents and seas were merely intended for reference in books of my own, not at all for general employment, and as they still serve their original purpose, I let them remain for awhile. But a certain silly idea started among the weaker-minded that these Martian names were things to be craved! Wherefore I incline to think that the sooner indifferent names are substituted the better. Schiaparelli, of Milan, has gone in for something of the sort; but, as none but scientific prigs could use his classically sesquipedal names, the thing will have to be done over again. For mere reference any Martian names will serve very well—the more indifferent the better; only we must be careful to prevent any Martian combination akin to the Birt-Webb-Neison ring (*vide* future section of "Americanisms") in the moon.*

The four views of Jupiter illustrate the varying aspect of the great spot since 1870. When the latest were obtained it was supposed that the spot was about shortly to disappear; but it has latterly resumed something of its former conspicuous appearance.

* I do not at the moment know whether that unknown family-party, introduced by Mr. Birt into the lunar maps, which aroused the wrath of Prof. Simon Newcomb, has yet been eliminated, but hope it has. Some astronomers have odd weaknesses this way. An American astronomer used to give to asteroids which he discovered names in honour of the ladies to whom he successively lost his heart. Fortunately—since his heart was rather readily lost—he discovered nearly enough asteroids to go round (the only asteroidal rotation yet recognised).

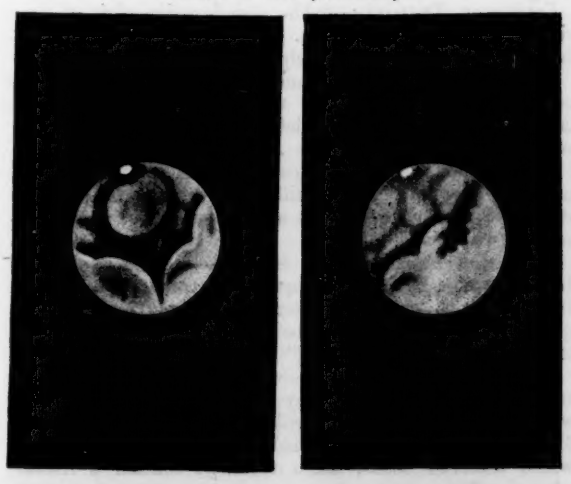


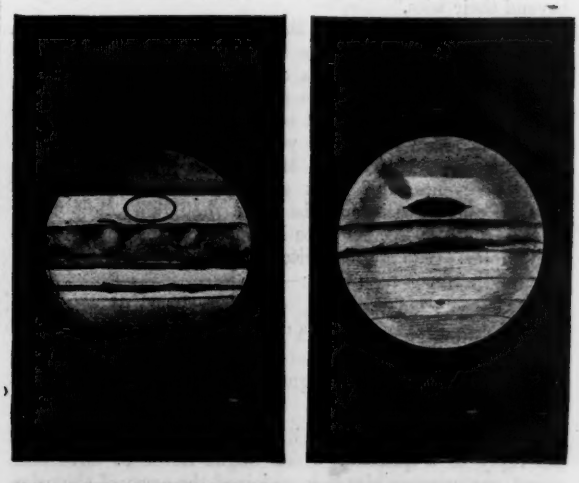
Mars in 1877 (Trouvelot).

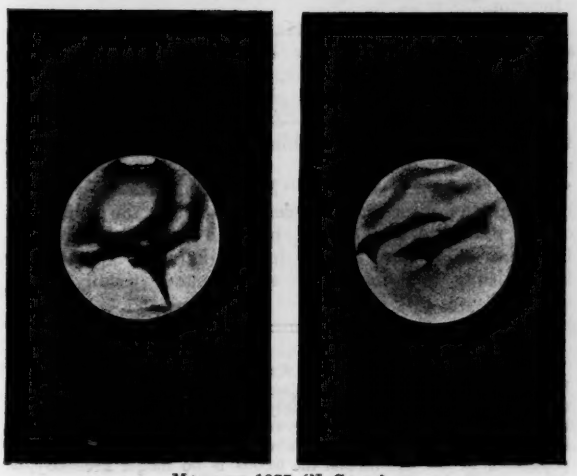
Jupiter in 1856 (De la Rue).

Great Ring in 1870

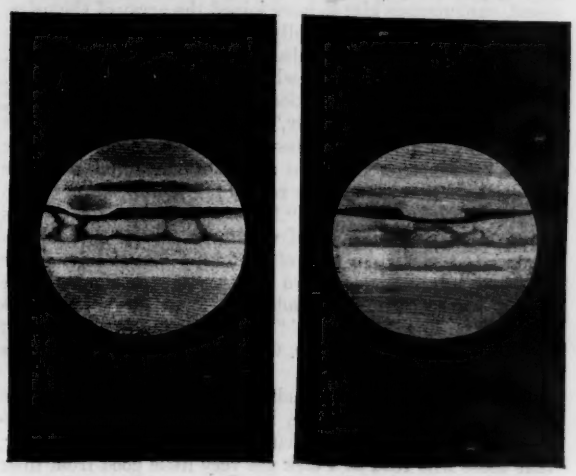
Great Spot in 1877







Mars in 1877 (N. Green).



Great Spot, May 17, 1883.

Great Spot, Sept 10, 1883.

THE HUNDRED BOOKS.

MR. STEAD having succeeded to his satisfaction in disclosing the amount of iniquity which underlies the respectable Pharisaism of British society, has not been content without further efforts in the direction of of mask-removing. He has appealed to numbers of persons who were supposed to have a certain amount of common-sense, and has succeeded in making a goodly percentage show themselves to be prigs "of the first water."

From all this mass of clotted conceit, it is refreshing to be able to select a few specimens of common-sense, touched by a humorous sense of the absurdity of the whole matter.

Thus, for example, does Mr. James Payn poke sly fun at Sir John Lubbock and his list:—"I have a great respect for Sir John Lubbock, but I do not agree with him as to systematic reading. When a particular object has to be attained reading cannot be too special; there is an enormous waste of intelligence through a neglect of this fact; but otherwise reading should 'come by nature.' When I read through the list of books you send me, I cannot help saying to myself, 'Here are the most admirable and varied materials for the formation of a prig.' There is no more common mistake in these days than the education of people beyond their wits."

In a lighter vein, Mr. Burnand indicates, with equal clearness, his opinion of the issue of these lists of books. *Punch*, by the way, gave a charming illustration, in the days of dear old Leech, of the priggishness of those who want to show that they have been educated "beyond their wits." "Mamma," says a hopeful young person of twelve or so, "I asked Mr. Harris and Miss Smith if they knew the principal events, and what great men flourished, in the seventh century before Christ: and they didn't, but I do, and——" she proceeds to cite Mangnall, to the horror of the community. The present editor of *Punch* cleverly castigates the hundred-book-man thus:—

"My Dear Sir,—How can I suggest any better reading than 'Happy Thoughts,' 'About Buying a Horse,' 'The Modern Sandford and Merton,' 'Strapmore,' 'One and Three,' 'More Happy Thoughts'?—Yours truly, F. C. Burnand."

Mr. Wilkie Collins, though at first, seeing the length of his reply to a question which ought never to have been asked, one supposes him to have joined the array of the prigs, writes very sensibly, especially in admitting likes and dislikes which they would reject with horror and disgust. Imagine the feelings with which a Ruskin, for example, would read a recommendation to enjoy "Peter Simple" and "Mr. Midshipman Easy," or the novels of Fenimore Cooper! But after all, the best thing in Mr. Collins's letter is the reference to the sound advice of Dr. Johnson: (how the good old boy would have roared his denunciation of the hundred-books nonsense!) "Never mind what I say," says Mr. Collins, "hear him. 'I would not advise a rigid adherence to a particular plan of study. I myself have never persisted in any plan for two days together. A man ought to read just as inclination leads him, for what he reads as a task will do him little good.'" As Captain Cuttle said of Bunsby, so say we with Mr. Collins of old Samuel, "Hear *him*."

Yet the results of this hundred-books absurdity have been useful; though not quite as intended. We have had excellent illustrations of the truth of Dr. Johnson's teaching, that those who read as a task get very little good from their reading. In such reading lie the materials for making, as we see, very first-class prigs. Then it is something that a writer so overweighed as Mr. Ruskin—outside his art criticism—should have been moved to disclose so much of his real nature. That list of Lubbock's scored by Ruskin tells a tale which even the admirers of his philosophy (so to call it) will not easily forget. The scoring out of Gibbon, Marcus Aurelius, Butler, Lucretius, Sophocles, Euripides, Grote, Mill, Darwin, Smith ("Wealth of Nations"), Descartes, Locke, Cooke, Longfellow, Hume, Macaulay, Emerson, Goethe, Thackeray, and George Eliot, speaks of a mind "much ill." (If all comparisons were not in our opinion as odious as the old proverb says, we might express the opinion, that to score out Thackeray and leave in Dickens, though it would be natural in a boy or girl or a person but half-grown intellectually, would suggest a mind which would set Sheridan Knowles above Shakespeare; but there would be this touch of unfairness in such a remark, that Dickens *has* reached the many, and that their love for him, though it indicates a lower type of excellence than Thackeray attained, shows at the same time that he had a special sympathy with the many, which in itself suggests an element of greatness.)

Among the "mixed criticisms" are included some of the very best. We quote the following as very good, and suggestive of a keen appreciation of the absurdity of the original idea:—

Professor Tyndall:—"The encyclopædic spirit of my friend Lubbock surprises me. If I could imitate him I should willingly lend you a helping hand, but I cannot."

Professor Jowett:—"I am afraid that I cannot add anything worth your having to Sir John Lubbock's list. It is a very good list, the chief fault being that it is too long."

Mr. Froude:—"People must choose their own reading, and Sir John Lubbock's list will do for a guide as well as others. I, at any rate, do not wish to put myself into competition with him."

Professor Freeman:—"I feel myself quite unable to draw up such a list as you propose, as I could not trust my own judgment on any matter not bearing on my own special studies, and I should be doubtless tempted to give too great prominence to them."

Sir Frederick Leighton:—"I have to own that my acquaintance with Philosophy and Letters is neither so wide nor so close as to furnish me with the materials for pronouncing, even if I had the faculty to determine, which hundred books, taken together, contain a liberal education."

The author of "John Halifax," Mrs. Craik:—"I always think readers know best how to choose their own books—what they like, and (equally important) what it is in their power to get."

Mr. Matthew Arnold:—"Lists such as Sir John Lubbock's are interesting things to look at, but I feel no disposition to make one."

Mr. Herbert Spencer:—"My reading has been much more in the direction of science than in the direction of general literature; and of such works in general literature as I have looked into I know comparatively little, being an impatient reader, and usually soon satiated."

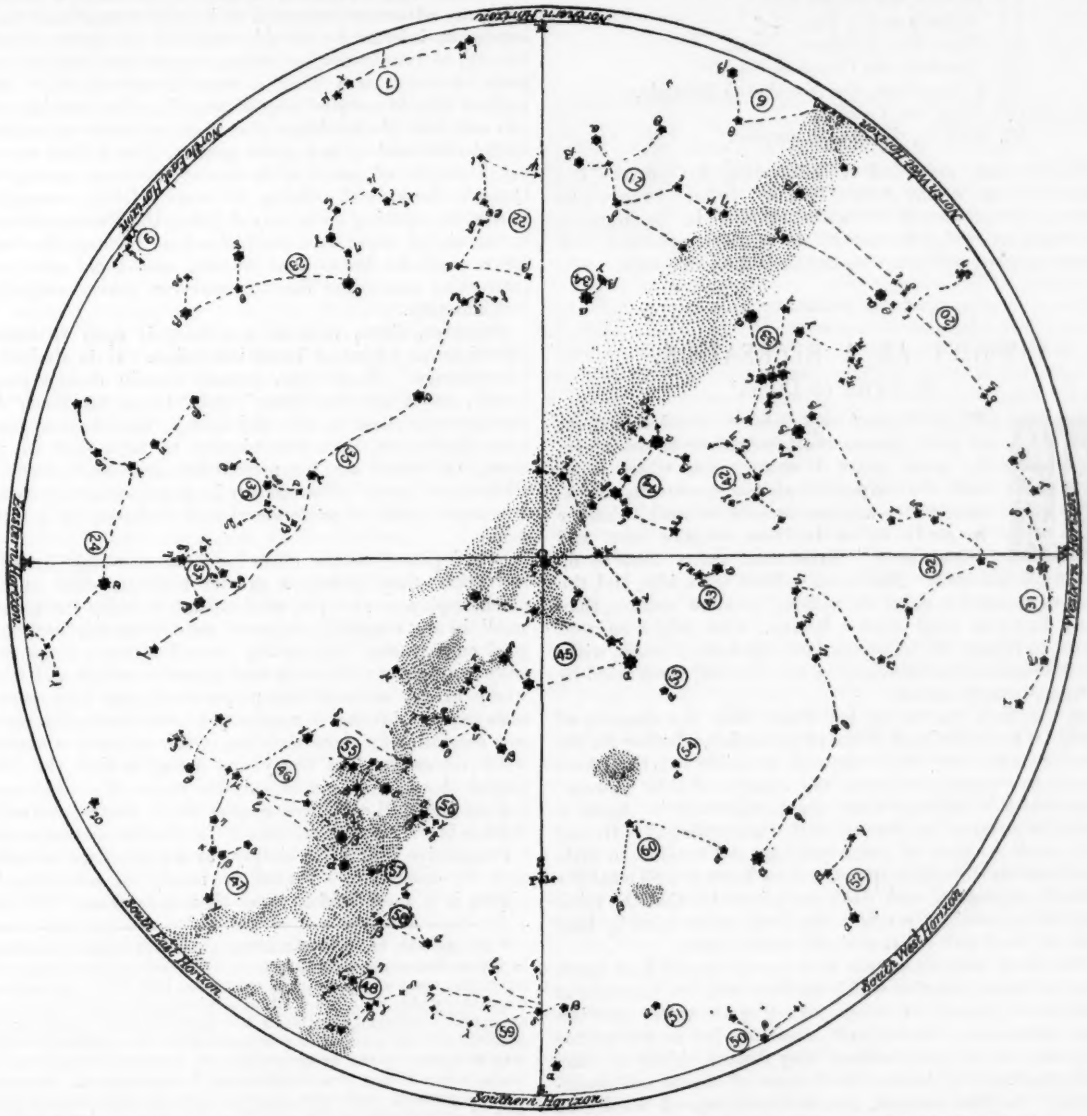
Panthers, Hyenas, and Jackals.—Twelve hundred panthers have been destroyed, 1,882 hyenas, and 27,000 jackals. The destruction of these creatures may safely be regarded as an unmixed benefit, though it would not be so were not civilisation extending so that the work of carnivorous animals in destroying the surplus population of the deserts and the woods is no longer necessary.—*Newcastle Weekly Chronicle.*

THE NIGHT SKIES IN AUSTRALIA, CAPE COLONY, &c.

AT last, I think I have hit upon the form in which the maps of the skies in the southern hemisphere will prove most useful. Yet must the map in the present number be regarded as only tentative.

It will interest the student of the heavens to note that the map which illustrates the skies of latitude 38° south, and is available for all places in the southern hemisphere between latitudes 30° and 45°, shows also the whole of the southern half of the sky, at the same hours, in latitude 52° north, or centrally for England. For the former use, that is for use in the southern hemisphere, the middle of the map marked O is the point over-head, and the circumference of the map represents the horizon. For use in the northern hemisphere the line E O W represents the horizon from east at E through south at O, and to west at W; while the point marked N is over-head, and the semi-circumference, E N W, represents the prime vertical.*

It seems curious to consider that that semicircle of the star sphere which forms our horizon from east through south to west at any hour is, on the same day and at the same hour of local time, a semicircle of the star sphere passing from east through the point overhead to west at a station 90° removed from us in southerly latitude. It would be a rather pretty problem in the astronomy of the late Parallax and of the still-flourishing Hampden, to show how stars which appear along a horizontal semicircle in England



The Sky in Australasia: and (Upper Half) the Southern Sky in England, at Seven o'clock, April 6.

* The points E and W are also overhead, the straight line N O S representing the horizon, for places on the equator six hours or three months later or earlier than the map dates.

can appear as a vertical semicircle in Cape Colony, the same stars appearing due east and due west respectively at both places. But the thing occurs, as I happen to have seen.

The Constellations are numbered as in my "Star Primer" up to 46 (*Centaurus*). The remaining numbers indicate the Constellations nearer the South Pole, viz.:—

47. *Lupus*, the Wolf.
48. *Ara*, the Altar.
49. *Indus*, the Indian.
50. *Grus*, the Crane.
51. *Toucan*, the Toucan.
52. *Phœnix*, the Phœnix.
53. *Dorado*, the Sword-Fish.
54. *Reticulum*, the Net.
55. *Crux*, the (Southern) Cross.
57. *Circinus*, the Compass.
58. *Triangulum*, the (Southern) Triangle.
59. *Pavo*, the Peacock.
60. *Hydrus*, the Water-Serpent.

The student may find it interesting to compare the alternate maps of my "Star Primer" (where twenty-four maps are given, instead of twelve only, as in the southern series and my "Half-hours with the Stars") with those now appearing here, which are on the same plan and scale.

WHIST AS A RECREATION.

By "Five of Clubs."

I ATTACH great importance to the development of good games, whether outdoor or sedentary. By good games I mean games which serve well the purpose of all games—to wit, recreation. Men engaged in arduous work, whether in study or in business, require rest and refreshment. Experience shows that to do nothing is not rest. The mind refuses to be idle, and the effort to make the mind do nothing is more arduous than many forms of hard mental labour. One might as well expect to repair the toil-worn body by mere idleness, without food and nourishment, as to rest the toil-worn mind by setting it simply at rest.

It has been shown by Dr. Paget that the element of "skill" is desirable in all forms of recreation, whether for the mind or for the body. It is essential, he points out, that there should be "opportunities for the exercise of skill in something which is different from our regular work." Again, a desirable element in recreation is "uncertainty." In our daily work we have so much sameness and routine, so little to interest us through surprise, and we know so well what the general progress of each day's work is to be, that the mind requires uncertainty, much as the body, when dried by long hours of hard toil, requires liquid nourishment.

For these reasons we see that among out-of-door sports those are most popular which combine both the elements of skill and of chance. Rowing and riding are better exercises than lawn-tennis, cricket, and base-ball; but as recreations they are not so good, because they depend chiefly on skill and practice, and possess no element of chance and uncertainty. In like manner, games which depend wholly on chance are inferior to those which also depend on skill—as roulette is inferior to bagatelle, and still more to billiards.

What is true of outdoor sports is true of sedentary home games. Apart from the gambling spirit, which has no real relation to recreation, and is rather a relic of savagery than a normal development in civilised communities, games of pure chance have little interest for grown persons. Children, to whom games are rather as business than as recreation, can find amusement in "Beggar my neighbour" and other card games in which skill plays no part. On the other hand, home games of pure skill afford no real refreshment to the tired mind. Many undoubtedly take interest in chess, which comes as near to being a game of pure skill as any that has yet been invented;* but those who love the game most find least recreation in it, unless, indeed, they play chess specially for recreation. And in passing I may note that I have found a way of getting much more "rest and refreshment" from chess than by any other plan I have ever tried. I had, indeed, given up the game as too taxing till the new plan occurred to me. It is this. I offer to mate my adversary (supposed of inferior strength, or made somewhat inferior by suitable odds) in so many moves—twenty, or twenty-five, or thirty, as the case may be—the game to count as a draw if won in more moves. This method affords a capital way of teaching the openings; for one may add the condition that such and such an opening shall be followed up to a given point. Thus I play, we will say, a couple of games with one of my boys, giving the Queen's Rook, and offering to mate within twenty-five moves, the opening to be played being the Evans's Gambit to the eighth move on a particular line. Doing this daily for a week, he learns that opening, and I get short and interesting games, the limited number of moves compelling brilliant play.

However, chess, even at the best, is open to serious objections as a form of home recreation. It is limited to two players. There are, indeed, certain dreary games known as "Chess for Three" and "Chess for Four," but they are not chess at all; and though consultation games may allow more than two players to take part in real chess, yet these are the profoundest and least restful of all forms of chess. Chess in any large gathering, or even in any home circle of moderate size, is undoubtedly a selfish game.

Card games, on the other hand, are not only better as recreation, they interest a greater number. The number of chess-players who play well enough to enjoy the game is small, in any company, compared with those who can enjoy good card games. By having several tables a large company can join even in such card games as euchre and whist, where, at the outside, four players only can take part in each game. All that is necessary to make card-play perfect as a recreation for those members of the company who really want recreation (not the young folks) is that the game played should combine in suitable degree the elements of chance and skill. In this respect whist stands unrivalled. Euchre is a livelier game, but it is shallow by comparison. "Progressive euchre" is simply, to my mind, an abomination of desolation. Piquet is nearly as scientific, but piquet is a more selfish game than even chess. "Poker"

* No one who has played much at chess will regard it as a game in which chance plays no part at all. For every chess-player must remember cases where his main attack has been foiled, yet, through some happy chance in the position of pieces advanced originally for an entirely different purpose, a new and brilliant attack may be opened, and the game won; or cases where an unforeseen attack may be foiled by the lucky position of a piece or pawn not set where it is with any idea that it might be so employed. How often, again, a pawn of one's own chances to be the only obstacle in the way of some otherwise sure assault on the enemy! Apart from this the surroundings have to be taken into account as affecting the progress of the game. I have won games entirely through the accidental disturbance of my opponent's mind by something which I chanced (*chanced* so far as the chess was concerned) not to care for; and I have lost and won games through causes similarly outside the game itself. I have won or saved games, again, through sheer chess accidents, and have lost games in a similar way. Yet, of course, in the main, skill is all in all at this royal game.

I regard as a game which might be excellent for recreation if it had not become essentially a gambling game, and fit only, as actually played, for cowboys and their kind. But whist is nearly perfect as a game of combined skill and chance. It is so good that it needs no such factitious excitement as money stakes supply. Indeed, a company of true lovers of this splendid game should be ashamed to play for money, just as two chess-players (outside the trained company of the professionals) would be ashamed to invite each other to contend for a stake. The only excuse for setting some small price on points at whist is that, where any of the players are not real lovers of whist, nothing but such an arrangement will keep them from spoiling the game by loose play, by talking of their hands, by telling their partner what they want him to do, and by running counter in other ways alike to the laws and etiquette of the game.

But whist, to have these good qualities, must be scientific whist, not mere play. A man may play what he calls whist for half a century and never know what whist really is. I played whist myself, evening after evening at home, and at college, and again on long sea journeys, for some thirty years—to wit, from the age of thirteen to that of forty-three—without getting any more recreation from it than the element of uncertainty without skill can supply. I do not say I did not find some exercise for memory and observation, or that occasionally, having learned from the most obvious indications of the play that the last three or four cards in each hand were so and so, I may not have correctly played from the position so reached. But this, when it happened, was the merest accident. In nineteen games out of twenty I was not playing whist at all. My excuse was that I knew no better. I played to complete the table, not for my own amusement. I had, indeed, conceived so much of a distaste for the game that I did not particularly care to learn from books what had been done in the way of combining skill with that element of chance which, like all other card games, whist possesses.

Whist properly played, however, is the best of home games. I reject the oft-quoted saying of Talleyrand in its favour, only because he said too little. To the young man who boasted that he played no whist Talleyrand replied: "Alas, young man, what a sad old age you are preparing for yourself!" But whist is worth more than to be a mere relaxation for old age. It is a game whose chief value lies in the service, *crede experto*, which it does for the busiest manhood.

Without considering the defects of what may be called family whist from a scientific point of view, it is obvious that the game is one of almost pure chance. Each player strives to make each good card in his hand as soon as he gets the chance. If he has a short suit, he tries to play out his cards in it, that he may trump the suit as soon as possible. His sole idea is to take advantage of the good cards or good features which chance has given to his hand. Of whist as thus played, the remark quoted by "Cavendish" in his "Card Essays" is sound—the game can be learned in a few minutes. "If that is the game," said a young man to whom the way of playing whist had been explained, "I can learn to play it as well as any one else in half an hour." That is actually the case. No one ever learns to play family whist better, after years of practice, than he did after his first fifteen or twenty hands—a tolerably good proof, if any were needed, of the monotony of the game, and its unfitness for the purpose of recreation.

Of real whist, on the other hand, Deschapelles, the finest player that ever lived (according to Clay, who was himself one of the finest, and had played with the great French master), said that years of practice are required even to teach a man how difficult the game is. A man may acquire the theory of scientific whist, indeed, and fall into the way of applying its principal rules systematically, in a few months. But years are required to make him a really fine player; and, even then, he finds that there remains room for improvement, until, after many years, he looks back on play which had formerly satisfied him as really far from the excellence he seems now to have acquired. Wherefore, while he may now regard himself justly as a good player, he will not—if he have noted the lesson from his past experience—regard his play as perfect, knowing that after a few more years he will recognise yet another advance.

THE SEA-SERPENT.

By Richard A. Proctor.

THERE is an interesting article on the sea-serpent in the *Cornhill Magazine*, bearing clear internal evidence of having been written by Mr. Grant Allen. In dealing with the sea-serpent, Mr. Allen calls into effective action a number of remarkable sea creatures, large enough and ugly enough to make the most hideous appearance when they condescend to ascend to the sea surface. The rhizodon, of the Indian and Pacific Oceans, a sharklike fish, is known to exceed fifty feet, and is said to have even measured seventy feet. The *Challenger* has dredged up from the Atlantic teeth of a shark which must have been nearly a hundred feet long—or rather, which must probably *be* so long as that, since it is altogether unlikely to have become extinct in the comparatively short period which has elapsed since the ooze was deposited in which the teeth were found. "Let us rest satisfied," he says, "with our big cuttle-fish and huge whales and monstrous sharks for the present; and whenever anybody catches us an enaliosaurian or a zeuglodon, or an immense marine snake, let us accept their new addition to zoology with all acclamation. Meanwhile, let us urge on all theorists, 'First catch your sea-serpent—then proceed to classify him.'"

The advice is, perhaps, not to the purpose. If anyone were to suggest that an Alpine peak ought to be brought to the sea level before geologists undertook to discuss its formation, the opinion would probably be that mountain peaks would remain for a rather long time unclassified. We are not very likely to hear of the actual capture of any of the great sea monsters which have been regarded as sea-serpents, any more than of those creatures, if such there are, which are actually serpentine, or lizard-like, or otherwise unlike sharks, whales, cuttle-fish, and the rest.

We may, however, for the present probably dismiss the zeuglodon theory of sea-serpents. Mr. Searles V. Wood regards the sea-serpent as a creature like a whale, and belonging to the same group as certain extinct toothed whales belonging to the Eocene period (the beginning of the tertiary era). These monsters ran to about fifty or sixty feet in length, and had most destructive fangs. It has been suggested that they were in reality a race in a state of transition from the seal-like to the whale-like character. They were originally land-dwellers, but had taken to the habit of swimming, till at last they came to resemble fish in outer form, though remaining warm-blooded air-breathers. But the theory that sea-serpents are (some of them) enaliosaurian is nearer to the evidence derived from their described forms. If we are to believe in some as yet unclassified sea-monsters at all, it seems on the whole simpler to recognise sea-serpents as enaliosaurian creatures (as they existed in ancient seas, with long necks extending from comparatively

small bodies, and using flippers as propellers), than to regard them as belonging to a race such as the zeuglodons, which do not seem to correspond anything like so nearly with the sea-serpent in appearance as the enaliosaurians must have done.

It is a pity that the average penny-a-liner never hears of the sea-serpent without attempting to be funny at the expense of the traveller who tells the story. For while it is certain, on the one hand, that we can never tell what the sea-serpent really is without obtaining all available information, it is certain, on the other hand, that few of those who may have information to give will tell their experience when they know that they will be exposed to ridicule. The mere fact that those who laugh at them are altogether contemptible makes the mischief greater, as the following story by "The Vagabond," a well-known Australian writer (I had the pleasure of meeting him in 1880), serves to show:—"Some years ago, Captain Austin Cooper and the officers and crew of the *Carlisle Castle*, on a voyage to Melbourne, saw 'the varmint.' A description and sketch of it were published in the *Argus*. This, when it arrived in London, it being the 'silly season' in journalism, was seized and torn to pieces by one of the young lions (that is, lion-skin-wearing asses) of the *Daily Telegraph*, in a leading article, in which much fun was poked at the gallant sailor. 'I don't see any more sea-serpents,' said my Irish friend to me. 'It is too much to be told that one of Green's commanders can't tell the difference between a piece of sea-weed and a live body in the water. If twenty serpents come on the starboard, all hands shall be ordered to look to port. No London penny-a-liner shall say again that Austin Cooper is a liar and a fool.'"

Between the idiots who invent silly sea-serpent stories, and the jeering boobies who conclude that all sea-serpent stories must be the work either of fools or of liars, men who have evidence worth listening to are silenced. It was bad enough when Professor Owen calmly suggested to Captain McQuhae, of the Government ship *Dædalus*, that he and his officers had been so frightened by the appearance of a strange sea creature as to mistake a sea-elephant, perhaps 20 feet long, for an animal of entirely different aspect and about 60 feet long. But he was at once put right, and by silence admitted that he had fallen (unwittingly) into impertinence. When, however, writers who have not been half-a-dozen years out of school undertake to tell experienced seamen that they are fools if they are not liars, *c'est par trop fort*, or, in the vernacular, one feels that that is "coming it a little too strong."—*Newcastle Weekly Chronicle.*

New Books to be Read (or avoided)—and Why.

A Time and Times: Ballads and Lyrics of East and West, by A. Werner (T. Fisher Unwin, London, 1886), because it contains some true poetry, and none of the maudlin stuff which self-styled poets are so apt to inflict upon us nowadays. Miss Werner's verses are graceful, nervous, and full of meaning, and many of the longer poems are suitable for recitation. As such may be mentioned "The White Witch of Perran Porth," "Bannerman of the Dandenong," and the two beautiful classical pieces, "Leaina" and "After the Battle." The contents of this little volume make one wish for more from the same pen.

Arminius Vambéry: his Life and Adventures. (T. Fisher Unwin. 1886.) The boy's edition of this popular book, which has already run through five other editions, was published by Mr. Unwin in time to be a welcome Christmas or New Year's gift to many an English boy, and will make a very acceptable school prize later on in the year. The autobiographer, in an introductory chapter addressed to the boys of England, tells how the desire to see foreign countries awoke in him at the tender age of six years. His youth was, however, passed amid poverty and privations in Hungary, and his travels did not commence until his twenty-second year, so that if any of his youthful readers feel inclined to follow Vambéry's example they must have patience and not begin by running away to sea. Throughout Vambéry seems to have lived entirely on his wits; but by dint of courage and what one is tempted to call "cheek"—if lady readers will forgive the expression—he has managed to come unscathed through some very remarkable adventures, which he tells with the utmost naïveté, even when they are hardly creditable to himself. The book is thoroughly interesting, beautifully illustrated, and got up in Mr. Unwin's well-known style.

Kaffir Folk-lore. By Geo. McCall Theal. Second Edition. (London: Swan Sonnenschein, Le Bas, & Lowrey. 1886.)—Mr. Theal says, and says truly, in his preface to the curious volume of tales before us, that "it is now generally recognised that in order to obtain correct information concerning an uncivilised race, a knowledge of their folk-lore is necessary." In this respect Kaffir folk-lore, like that of all semi-savage races, is highly instructive, adding yet again to the mass of evidence as to the identity of the purely childish type of mind and its universality among uncivilised people over the entire surface of the habitable world. Naturally, every such collection of stories peculiar to races widely separated geographically must possess a certain amount of local peculiarity and colouring; but, after making due allowance for this, the ultimate resemblance between the primitive stories of the most diverse types of mankind cannot fail to strike the least careful observer. Birds play a conspicuous part in these Kaffir tales, generally in the *rôle* of friends or good fairies to those in difficulty or distress. The giant or ogre of our European nursery tales finds his analogue in Kaffirland in the cannibal, whose intellectual capacity, we may incidentally note, appears to be quite on a par with that of the monster who fatuously slit himself up in attempted imitation of his guest in our own veracious legend of "Jack the Giant-killer." In "The Story of Hlakanyana," again, we have a sequent iteration of his adventures by the hero, resembling in form, if not in detail, that in "The House that Jack Built;" while the hare, the jackal, and many of their friends suggest the strongest reminiscences of the imperishable "B'rer Rabbit" and his associates in "Uncle Remus." A useful introductory chapter on the Kaffir folk themselves, and a full appendix of instructive notes on the various tales, add considerably to the value of this curious and readable volume.

The Elements of Economics. By Henry Dunning Macleod, M.A. Vol. II. Part I. (London: Longmans, Green, & Co., 1886.)—We make acquaintance with the work whose title heads this notice through its second volume, not having, so far, had the good fortune to see the first. It is not, however, very difficult to deduce Mr. Macleod's eclectic system of political economy from this second instalment of his work; and we feel quite justified in saying that if (as we may assume to be certain) the previous portion of the book before us is as sound in its inferences and apposite in its illustrations as the one before us, it as a whole constitutes a valuable and important contribution to economical science. The volume opens with an amusing refutation of

the fallacies of Ricardo in connection with the quantity of labour and the cost of production, and, incidentally, Mill's self-contradiction does not escape criticism. The subject of profits is next discussed, as are in succession interest and discount. We then arrive at the *vexata quæstio* of rent, and here again our author makes mincemeat of Ricardo's teaching, and shows how, if landlords were swept off the face of the earth, the consumer would derive no benefit whatever. The chapter on labour, which follows the one on rent, is eminently well worth reading, demolishing as it does certain stock dicta of political economists which have come to be regarded almost in the light of fetishes; or, at any rate, as being inexpugnably true and quite unassailable. The eleventh chapter deals with rights or incorporeal wealth, and the work is brought to a conclusion by a series of successive dissertations on foreign exchanges, Law's theory of paper money, the definition of currency, and the organisation of the Bank of England. On the practical value of this portion of the volume to the banker, merchant, and financier it is quite needless to insist; while the less special parts of it will commend themselves by their soundness, accuracy, and, in short, plain commonsense, to every student of the science of economics.

School Electricity. By J. E. H. Gordon, B.A. Camb. (London: Sampson Low, Marston, Searle, & Rivington. 1886.)—Mr. Gordon modestly calls this capital book "School Electricity," but the adult who will take the pains to master its contents will have derived no mean knowledge of the science. For it certainly enters into more varied detail of an elementary kind than any similar book which has, up to the present time, fallen under our notice, and supplies just that kind and amount of information needed for the intelligent apprehension of the principles of electrical measurement, and the practical application of electricity in the telephone, the electric bell, electric lighting, the dynamo, electrolysis, the induction coil, &c., to say nothing of its more recondite affinities with other forms of force. Our author commences with a description of the nature and most salient effects of the electric current, and in the outset explains Ohm's law. The question of the speed of the current through wires and telegraph cables naturally leads to the subject of magnets and electro-magnets, to lines of force, and the application of the magnet to telegraphy. Then a chapter on the relation of electric currents and pressure to mechanical forces is followed by a highly practical one on electrical units. After this the sources of electricity are discussed, as are in succession electro-measurements, telegraphy, the telephone, electric bells, electric lighting, and electrolysis. From these more especially economical applications of electricity we pass to diamagnetism and magne-crystallic action, the induction coil, and Crookes's marvellous researches on radiant matter, the volume concluding with chapters on the action of magnetism and electricity on polarised light, and on Clerk Maxwell's electro-magnetic theory of light itself. A series of examination papers forms a kind of appendix (in addition to questions which appear at the end of each chapter), and an index completes the work. We can heartily recommend Mr. Gordon's volume to all students of electricity.

The Laws of Nature and the Laws of God: A Reply to Professor Drummond. By Samuel Cockburn, M.D., L.R.C.S.E. (London: Swan Sonnenschein, Le Bas, & Lowrey. 1886.)—That a gigantic *petitio principii* underlies the whole of the arguments in Professor Drummond's very able and remarkable book, he would himself probably be scarcely concerned to deny. Admitting, however, his postulate, no one can fail to admire the conspicuous ability, moderation, scholarship, and eloquence with which he advances and enforces his thesis, and hence anything claiming to be a "reply" to his contention must, to be in the least degree effective, meet him on his own ground. This Dr. Cockburn fails, hopelessly, to do in the mass of twaddle now before us. His argument, if it can be dignified by that name, is founded on the familiar type of polemics to be heard in street discussions. "I say it is." "I say it is isn't," and so on *da capo*. Two quoted specimens of his science and theology respectively will suffice to exhibit his argumentative and ratiocinative power. The first develops a new theory of genesis, and is to be found on pp. 18 and 19. "The forms of matter are often determined by conditions under the control of man, and thus, in so far as the forms are concerned, he becomes a creator in the sense of a potter. . . . . There are noxious and destructive forms of matter which in a paradisaical condition could have had no existence, *and which never were created by God*, and which in a truly regenerated condition could be of no use, and consequently could not exist. We need only mention in this connection all the family of parasites and the widespread, destructive germs of disease." If this sentence (and notably the words we have italicised) means anything, which is, of course, open to discussion, it can only be interpreted as signifying that, while the sunshine, the rose, and the lamb were the subjects of Divine creation; the louse, the flea, and the stomach-ache are the products of man's perverted pottering with protoplasm. Our theological quotation shall be shorter still. On page 35 we read:—"The man spiritually dead is not what God made him, and *not what God intended him to be*" (the italics are again ours). Whether Dr. Cockburn here denies the omnipotence or the omniscience of his Deity, he does not condescend to inform us. If Professor Drummond had been seeking an easy triumph, we can well imagine him repeating the concluding clause of the 35th verse of Job xxxi. in connection with a farrago which we close with a sigh of relief.

Gossip.

By Richard A. Proctor.

In reply to many questions, I note that the translation of Josephus, from which I quoted in "A Historical Puzzle," and last month, is Whiston's well-known one. So far as I know, there is only one edition of that translation published, and a singularly cheap one it is.

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Many correspondents have been careful to point out that several theologians have accepted, as genuine, the passage in which Josephus is made to refer to Christ as being the Messiah. Of course, that is well known. Whiston himself accepts the passage. Even Renan does. But Renan, like the theologians, held a retainer for that side. The theologians who reject it are more to the purpose.

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The evidence would satisfy any one who had not been trained to see everything of one colour till his natural eyesight was of no use to him. After Photius had tried to explain why there was no reference to John the Baptist, we find a passage relating to John the Baptist which Photius must either not have known, or must have rejected. After Origen had dwelt on the absence of all reference to Christ, we find a passage relating to Christ as veritably in Josephus's opinion the Messiah. And it is not noticed by theologians of the "find-anything-in-anything" school censured by Bishop Butler, that not only do the two passages stare out as interpolations, even as patches of yellow in a purple garment,

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but they make the silence of Josephus elsewhere more stupendously amazing.

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The "deliberate dishonesty" theory one can understand: though it may outrage probability, it stands at any rate four-square. But this, the only conceivable explanation of Josephus's silence about events said to have happened in the very time about which he inquired most diligently, in the city where his father and family had lived in high repute and consideration, and to whose archives and records he had freest access, is simply knocked on the head if we accept as genuine the passages to which I have referred as manifestly and admittedly interpolations. That a man capable of dishonest silence throughout all the rest of his voluminous works (about events said to have happened with such surprising circumstances that every one, poor and rich, was moved by them) should have written, nevertheless, a paragraph stating that the Messiah expected by the Jews at that very time had actually appeared and wrought many marvellous works, is simply what no one not lunatic, as De Quincey puts it, can suppose when he thinks of it. A through-thick-and-thin theologian, of course, has nothing to do with thinking about such things, and may consistently refrain; but a sound theologian acts more wisely.

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If we found a long account of a summer day's jaunt round Hougoumont and Waterloo on June 18, 1815, without any reference to such a trifle as a battle thereabouts, we might understand that there was a mistake somewhere; but if some one pointed out a passage before unnoticed, stating that, "as we were sitting down to lunch, we observed that a battle was in progress half a mile off during which many surprising episodes occurred; the lunch also was excellent, and when it was over we sauntered past Hougoumont, collecting many pretty flowers by the way;" and so on, we should hardly find in that passing reference to the Battle of Waterloo an explanation of the difficulty. Even a half-crazed historian would hardly quote that letter as throwing any light on the condition of the roads, or the weather, or the feelings of the peasantry, on the day when the Fight of Giants was fought out.

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To any one who thinks for himself a little, the interpolated passage in Josephus in which the coming of the Messiah, which would be to a Jew the most important and enthralling of all possible events, is thrown in casually as a mere detail in the midst of a history whose whole colour would have been altered if Josephus had had any inkling of such an event, must seem as inconceivably out of place as a mere passing reference to the Battle of Waterloo in a letter supposed to describe events which took place on the field and on the day of that great conflict.

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A deliberate determination to reject and deny what he did not want to accept and announce is the only conceivable explanation of Josephus's silence, if we take choice among any of the dates to which the diverse narratives in the Gospels necessarily point. Rejecting the interpolated passage is not raising but avoiding a difficulty. But if we accept that explanation, as Canon Farrar suggests that we should (it is not an explanation *I* have suggested), we can hardly escape the inference of further offence against honesty involved in the passages which I quoted. We want no confirmation from the author of "Supernatural Religion," from Mr. Solomon (whom I only mentioned because it was the reading of a part of his book which led me to read over Josephus again), from Mr. Matthew Arnold, or from any one else. *There* are the passages in Josephus's book. Let them be taken, if any will, as mere coincidences; they are then very curious of their kind, as is the mind (I fancy) which can so regard them. But I had nothing to do with making them.

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Nor am I concerned by such objections as that Zechariah, the son of Baruch, and Zechariah, the son of Barachiah (in the Revised Old Testament we have Berechiah), cannot have been one and the same person. Josephus knew all about the prophet, and had probably as keen a recognition of the fact that the person slain in the temple was not the prophet as has any theologian of the present time. [Whether a Jew unlearned enough to mistake the Hebrew way of saying the same thing more than once as saying two different things, and so inventing diverse fulfilments of the same prophecy (as in supplying not only an ass, but "also and moreover" a colt, the foal of an ass, and in not only dividing a vesture, but having lots cast for a garment), would be equally sure about the distinction, is a matter not so clear, and not being at present a student of theology, I desire to express no opinion on that point.] But I was picturing Josephus in the fancy character of a plagiarist, and my argument has nothing whatever to do with the question whether Baruch and Barachiah, or Berechiah, can be the same person. Josephus as a plagiarist would probably make them different persons. Regarding him merely as a historian, which is after all the safer plan, all we know for certain is that, according to his account, one Zechariah, son of Baruch, was killed within the temple, to the great horror of the Jews, some forty years after the time when Matthew speaks of a reference to the similar and similarly startling murder of one Zechariah, son of Barachiah.

* * *

M. Pachmann's sudden loss of music-memory when, unfortunately, he was taking part in a concerted piece (so that he could not pass over the gap by original composition) has been much commented upon. He has been seriously blamed for trusting, under such circumstances, to memory. But it may well be questioned whether the superior effects obtained when a player trusts to memory rather than to book are not cheaply purchased at the risk of occasional failure. A player must either follow the book *seriatim* or not at all. He cannot, as some of the musical critics seriously advised, have the book before him to put him right at any moment. If Pachmann had the music before him, and was moved, after playing a page or two, to throw all his fire into his fingers, leaving the printed notes alone, he would fail just as completely, if memory deserted him for a moment, with the book before him, even though it were open at the right place and he knew the precise spot where the slip occurred, as though he had no book at all. Now, there can be no doubt whatever that Pachmann playing a piece through from the book, would be a different performer altogether from Pachmann luxuriating in the rendering of the same piece from memory. The very fact that he plays in public constantly from memory unfits him from playing before the public from book. It was the same with Ketten. He said to me on this very subject (I had touched on the risk of a sudden slip of memory), "I shall play from book and I shall play from memory; but when I play from memory I am Henri Ketten, when I play in public from book I shall be some one else."

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Memory in such matters plays curious tricks. Dickens found that those passages which he had recited oftenest were precisely those which he could least trust himself to recite

without book. If he went wrong through some momentary slip, he was wrong altogether. There were no side-holds for the memory to grasp at.

* * *

My own experience has been similar. In my lectures I frequently find it convenient to recite passages from memory. Some of these I have recited so often that I hold them entirely by what may be called syllabic memory. Now I know that I must either entirely relearn these passages or else in reciting them I must trust solely to the syllabic succession of sounds. If I were to begin to think about the succession of ideas I should be very apt to get off the syllabic track, and then I should be hopelessly lost. But one may get off the syllabic track even when avoiding the distraction of thinking about the succession of ideas. The accidental misplacement of a word, or even of a gesture, will throw the memory out. (I should not wonder if Pachmann's trouble arose from a slight change of fingering in a piece which he knew rather too well.)

* * *

A singular accident of this sort occurred to me once when I was closing a lecture at Columbia, South Carolina. I used for *finale* certain lines in Anstey's translation of "Faust," which I suppose I must have repeated a thousand times. They begin—

> See all things with each other blending,
> Each to all its being lending,
> Each on all in turn depending.

Now, unconsciously I have fallen into the habit, when reciting this passage, of using gestures in some degree corresponding with the ideas suggested by each line. I bring my hands towards each other, with open fingers, towards the close of the first line, as if blending together objects (indefinite in nature) in front of me; I throw out my hands, fingers closed, in the second line, as if lending; I move my hands downwards, as if setting objects in dependence on other objects, as I repeat the third line; and so on to the end. But I had never noticed how these gestures had become associated with the action of the memory when I was reciting this effective *finale*, till, on the occasion I refer to, the fact was brought to my notice in a rather unpleasant way. Not using the customary gestures in the first two lines, I went wrong syllabically in the second, saying "each *on*," instead of "each *to*." It will hardly be believed that so slight a fault brought me utterly to grief. After vainly trying to pick up the third and fourth lines, I tried back from the beginning, but again I failed, this time at about the fifth line. A third time I tried, and so far as those of the audience were concerned who did not know the lines, I seemed to get through all right. But in reality I failed as egregiously in the matter of memory that third time as the other two; only, having determined to get through somehow, I eked out memory with invention, and, composing five or six lines of my own, brought the quotation (save the mark!) to a close. I was rather tickled when some one told me afterwards that he was glad I had been able, after all, to recall those fine lines. (I cannot recall my own lines, but I have a notion they were rather fine nonsense.) I had not had so unpleasant an experience since I first learnt what a wide difference there is between knowing a passage by heart for recital to yourself and knowing it for recital before a crowded audience.

* * *

Mr. Labouchere, who wants to reform the hereditary House, is also evil-minded enough to object to the fine old manner of walking backwards before hereditary rulers. He would thus destroy an effective illustration of hereditary humbug. But stay; reading on, I find he is not so wildly, so madly revolutionary after all. He proposes only a change. He suggests that it would do if, instead of walking backwards at the risk of tumbling, the abject ones tumbled in the first instance, and allowed royalty to honour them by trampling a little upon their prostrate bodies, or giving them an appropriate kick or two. I fear he is not in real earnest. Nothing is sacred to some men. It is saddening.

* * *

The discussion raised in the *Guardian* by Prof. Pritchard's remarkable change of face in regard to the cosmogonies combined in the opening chapters of Genesis is interesting, and in some degree amusing: all the writers are so singularly clear that they are discussing what was literally God's Word, and so singularly blind to the fact that their differences of opinion as to its meaning amounts to very unfavourable criticism of the whole record! What would be thought if a dozen critics, knowing some passage to be by Milton or Shakespeare, were to agree in saying, It is magnificent, it is the grandest and most beautiful thing either poet ever wrote; but—we have not a clear idea as to what it actually means? We other folks, who recognise in the opening chapters of Genesis a very interesting relic of ancient science, edited after the Babylonian exile, and ingeniously combining with an old account ideas belonging to much later times, are surely much more respectful—not to say less blasphemous—than those who picture Deity as either not knowing much about His own work, or else as writing (whether designedly or otherwise) so as to confuse counsel. The theologians, at any rate, *are* confused. For though when they work together their unanimity is wonderful, the case is very different when they work apart. Under such conditions they somewhat resemble Susanna's elders.

* * *

They agree tolerably in rejecting Professor Pritchard's "sleeping seer," who is, indeed, only a mild version of Dean Stanley's "gifted seer." Professor Pritchard will allow no truth in the old story, only wonderful beauty. All other cosmogonies, he tells us, are dull and prosaic beside the first chapter in Genesis. This reminds me of a speech made after a lecture I had given about the Star-depths. The reverend chairman said, somewhat at length, that what the audience had heard about the glories of the star-strewn universe, the millions of millions of suns, each pouring forth such amazing supplies of light and heat, and with them life to circling worlds—all this, and infinitely more, had been already expressed in words which were the most beautiful, the most awe-inspiring, the most impressive of all that had ever been uttered by man about the heavenly bodies,—those glorious and noble words—(the audience waited in mute expectancy)—"He made the stars also." For, setting aside all thought of scientific accuracy, all question of inspiration, it must assuredly be admitted that four-fifths of the chapter which seems so poetical and beautiful to Professor Pritchard is mere cataloguing. He might as reasonably tell us to be moved to emotion by that noble verse, that most impressive passage—"Eber, Peleg, Reu." We need not deny the genealogical value of the list of the descendants from Shem; some may even consider that an ancient Hebrew was moved by divine inspiration to record them; but to find poetical beauty or noble imagery in "Eber, Peleg, Reu" is to "offer to the Almighty the unclean sacrifice of a lie." It is bad enough to offer bad science and unsatisfactory literature to God as His own; but one may do worse even than that.

* * *

The Secretary of the Victoria Institute has singularly misapprehended my remarks about the reading of Mr. Boscawen's paper. I really fail to understand how anyone

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could imagine me to be in earnest in rebuking the society for their evil ways in encouraging the spread of truth. Of course I think the society altogether right. What tickled me, and still tickles me immensely, was the absurdity of the comments made by one or two strangely-minded persons about a paper which is as entirely inconsistent with the Bible genealogy of the Semite race as it could well be. I am always very much amused by examples of the Rogue Riderhood style of glorification—the *Now*-say-I'm-a-liar tone—which feeble-minded persons display when such ancient records as the Cuneiform cosmogony, the account of Izdubar, and the like, or tablets relating to events which happened of old in Palestine, are brought to light. Something in the Hebrew record corresponds with something in the ancient record on rock or clay, relating no doubt to the same events, and immediately most of the half-educated among the clergy (and, alas! they are many) proclaim their joy in a tone implying a most unreverent astonishment; as if they went about in constant fear lest records should appear proving the Bible history (probably accurate in most of its details) to be false and misleading. I know none who so gravely insult and oppugn the Bible records as these loudest-voiced and least cultured of the clerical community. It is refreshing to turn from such weaknesses to the writings of men like Arnold, Stanley, Temple, and Abbott.

* * *

It has been arranged that I should deliver two more discourses at South Place Chapel, Finsbury Circus—viz., Sunday, April 4, on "The Bible and Science;" Sunday, April 11, on "The Bible and Duty." The hour on each occasion is 11.15 A.M.; admission free.

* * *

I am pleased to see that the London Stereoscopic Company, Limited, will hold their second annual International Amateur Photographic Exhibition at Archibald Ramsden's Pianoforte Galleries, 103 New Bond Street, from April 15 to May 24 current, under the patronage of the Princess Frederica, the profits to be given to the Princess's Convalescent Home at Hampton Court. Photography has, of late years, advanced by rapid strides, and, besides affording almost unlimited pleasure and instruction to amateurs who pursue it, it has proved a veritable boon in many ways to the science student. I hope the exhibition may prove an unqualified success.

* * *

A friend points out that a number of the expressions under the head "Americanisms" are English too. I know it. But they are properly called Americanisms all the same, in being much more widely and generally used in America than in the old country. For instance, everyone knows that Bundling, regarded as a custom, has prevailed in Wales for hundreds of years, and it is said still to exist in certain English-speaking counties, where doubtless the word also existed long before it came to be used in New England. Yet the word "bundle" so used is undoubtedly an Americanism.

* * *

So "of no account" is English, yet to speak of "a no-account man" is an Americanism, and indicates the more general use even of the original expression in America. "Bang-up" appears in Pierce Egan's elegant writings, but in America is probably older than George IV.'s time, and is now certainly more common there than here. "Beat," used as in the sentence "that beats everything," is as widely English as any expression can well be; and I fancy Mr. John Brown used the expression, "Did anyone ever see the beat of that?" on some occasion described in a certain awe-inspiring diary. Yet the multiplied forms of the use of "beat" as noun and verb must be regarded as characteristic of American talk. "I am bound to win" is as English as "I am bound to admit," yet no one who has noticed the multitudinous ways in which the word "bound" is used in America can doubt its having achieved the position of an Americanism.

THE FACE OF THE SKY FOR APRIL.

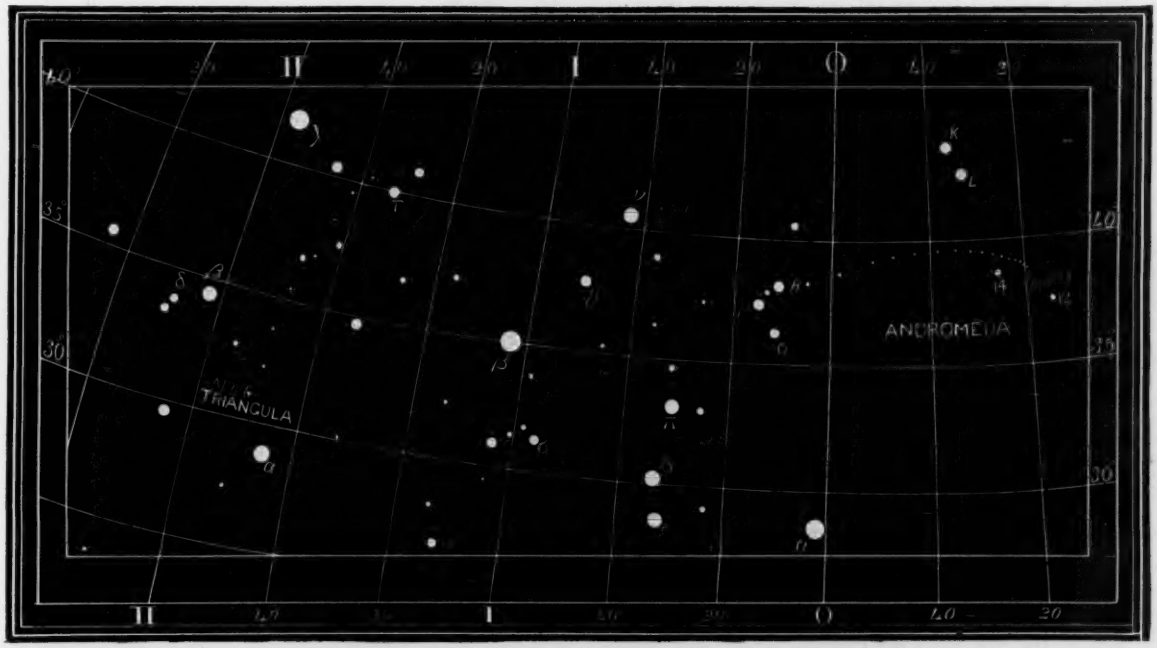
By F.R.A.S.

[In resuming (in accordance with the Editorial announcement on page 164) this series of descriptive notices of the aspect of the sky during the successive months of the year, we would point out that for their profitable use and apprehension the student should provide himself with the volume of maps entitled "The Stars in their Seasons," by the Conductor of Knowledge, and should also carefully read the papers on "The Phenomena of Jupiter's Satellites," and on "Lunar Occultations," on pages 126 and 267 respectively of our fifth volume. With which preliminary advice we proceed to the immediate subject of our Notes.]

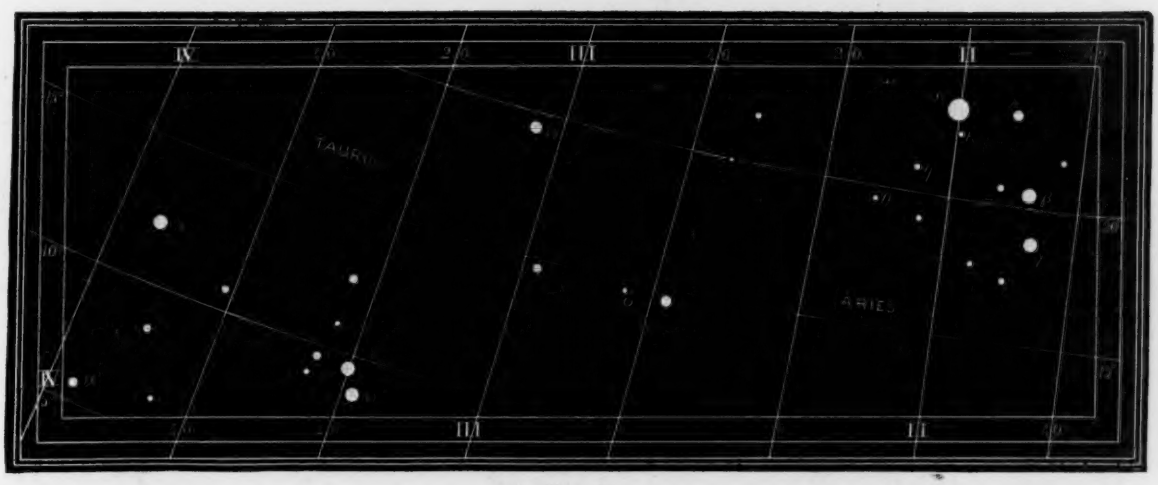
THE sun should be examined on every clear day for spots and faculæ. The period of maximum being now definitely past, no such splendid individual spots and groups as appeared in 1884–85 are now visible; but still at less frequent intervals very fine and striking indications of disturbance appear on the sun's disc. At the beginning of the month the zodiacal light may still be seen in the west after sunset. The night sky is depicted in map iv. of "The Stars in their Seasons." Minima of the remarkable variable star Algol in Perseus ("The Stars in their Seasons," map xii.) will occur on April 10, at 2h. 49m. A.M.; on April 12, 11h. 38m. P.M.; and on April 15, at 8h. 27m. P.M. For all practical purposes Mercury will be invisible during April, as he comes into inferior conjunction with the sun, or, in other words, between the sun and the earth, at four o'clock in the early morning of the 9th. Venus may be seen glittering brilliantly to the south of east before sunrise. In the telescope she exhibits a beautiful crescent just now. Mars is visible through the entire working night of the ordinary amateur, and will be seen as a fiery-red star to the east and north of ρ Leonis ("The Stars in their Seasons," map iv.) The dark markings or "seas" and the Polar snow are still fairly observable even in a three-inch telescope, but the angular diameter of the planet diminishes towards the latter part of April. He is now slightly gibbous—*i.e.*, not quite round. Jupiter is a noble object in any telescope. He will be found between β and η Virginis ("The Stars in their Seasons," map iv.) His angular equatorial diameter is 41·2″ on April 1, but by the 30th it has diminished to 39·4″. The phenomena of his satellites visible before 1 A.M. are numerous and interesting. Beginning with to-night: a transit of Satellite I. will commence at 11h. 9m., followed by that of its shadow at 11h. 24m. On the 2nd, Satellite I. will be occulted at 8h. 20m. P.M., as will Satellite II. at 9h. 23m. Then at 10h. 50m. 50s. Satellite I. will reappear from eclipse, Satellite II. similarly reappearing 42m. 47s. after midnight. On the 3rd, Satellite I. will pass off Jupiter's face at 7h. 50m. P.M., as will its shadow at 8h. 9m. On the 4th, the shadow of Satellite III. will enter on to the planet's face at 7h. 50m. P.M., and the satellite casting it leave his opposite limb at 9h. 21m., its shadow not quitting the disc of Jupiter until 10h. 47m. All transits of the two outer satellites should be sedulously watched, as they, practically invariably, cross Jupiter's face as *dark* spots, besides presenting other curious phenomena. On the 5th the shadow of Satellite IV. will enter on his limb at 11h. 49m. P.M. On the 8th Satellite I. will begin its transit 54 minutes after midnight. On the 9th the same satellite will be occulted at 10h. 5m. P.M., as will Satellite II. at 11h. 39m. Then at 12h. 44m. 46s., Satellite I. will reappear from eclipse. On the 10th the ingress of the shadow of Satellite I., the egress of the satellite casting it, and the subsequent egress of the shadow will follow each other in succession at 7h. 48m., 9h. 35m., and 10h. 4m. P.M. respectively. On the 11th, Satellite II. will pass off the planet's limb at 8h. 48m. P.M., as will its shadow at 9h. 49m. Then Satellite III. will begin its transit at 9h. 51m., followed by its shadow at 11h. 49m. The Satellite will leave Jupiter's opposite limb at 12h. 41m. P.M., the

shadow not until the next morning. On the 16th, Satellite I. will be occulted at 11h. 49m. On the 17th the ingress of Satellite I. will happen at 9h. 5m. P.M., and that of its shadow at 9h. 43m. The Satellite will leave the face of the planet at 11h. 21m.; the shadow at 11h. 58m. P.M. On the 18th the transit of Satellite II. will begin at 8h. 18m. P.M., and then Satellite I. will reappear from eclipse at 9h. 7m. 21s. Later, the shadow of Satellite II. will enter on to the planet at 9h. 36m. The satellite will quit the opposite limb at 11h. 4m., and its shadow follow it 23m. after at 9h. 23m. P.M.; Satellite III. disappear in eclipse at 9h. 59m.; to reappear from eclipse at 12h. 41m. 19s. P.M. Finally, on the 30th, Satellite IV. will be occulted at 8h. 33m. P.M. reappearing from occultation at 10h. 1m.

Saturn, not far from η Geminorum ("The Stars in their Seasons," map ii.), may be seen in the western sky after it gets dark; but he is now very indifferently placed for the observer, and Uranus may be detected on a moonless night with the naked eye, as a very small star to the south and east of η Virginis ("The Stars in



Map 1.



Map 2.

midnight. On the 22nd Satellite III. will reappear from eclipse at 8h. 43m. 44s. P.M. On the 24th the ingress of Satellite I. will occur at 10h. 52m. P.M., and that of its shadow at 11h. 37m. On the 25th the transit of Satellite II. commences at 10h. 35m. P.M. Satellite I. will reappear from eclipse at 11h. 10m. 34s., and the shadow of Satellite II. follow the satellite itself on to the planet's face at 12h. 10m. On the 26th the shadow of Satellite I. will pass off at 8h. 22m. P.M. On the 27th Satellite II. will reappear from eclipse at 9h. 52m. On the 29th, Satellite III. will reappear from occultation

their Seasons," map v.). His occultation by the moon on the 16th will be spoken of below. The moon is new at 2h. 30m. 6s. P.M. on the 4th, enters her first quarter at 8h. 44m. P.M. on the 11th, is full at 2h. 59m. 2s. P.M. on the 18th, and enters her last quarter at 5h. 15m. 5s. A.M. on the 26th. She will occult seven stars besides the planet Uranus at convenient hours for observation during April. The first occultation is one to which particular attention should be paid. It is that of Aldebaran during the afternoon of the 8th, when the star will disappear at the dark limb of the moon at 5h. 8m.

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at an angle of 175° from her vertex, and reappear at her bright limb at 5h. 54m. at an angle from her vertex of 257°. On the 9th the 6th mag. star 130 Tauri will disappear at the dark limb at 11h. 49m. P.M. at a vertical angle of 175°. The moon will have set before it reappears. On the 10th, 20 Geminorum, a star of the 5½th mag. will disappear at the dark limb at 10h. 25m. P.M. at an angle of 143° from the moon's vertex, and reappear at her bright limb at 11h. 18m. P.M. at a vertical angle of 285°. On the 14th, 48 Leonis, a 6th mag. star, will disappear at the dark limb at 10h. 57m. P.M. at a vertical angle of 40°, reappearing at the bright limb at 11h. 40m. at an angle of 329° from the vertex of the moon. On the 15th, τ Leonis of the 5th mag. will disappear at 9h. 21m. P.M. at her dark limb at an angle from her vertex of 359°, to reappear at the bright limb at 9h. 55m. P.M. at a vertical angle of 310°. On the 16th, 13 Virginis, a 6th mag. star, will disappear at the dark limb at 6h. 14m. P.M. at a vertical angle of 69°, and reappear at the bright limb at 7h. 4m. P.M. at an angle of 180° from the vertex of the moon. Later on, at 9h. 58m. the dark limb of the moon will occult Uranus, who will disappear at an angle of 6° from the lunar vertex. He will reappear at her bright limb at 10h. 44m. P.M. at a vertical angle of 297°. Lastly, on the 18th, κ Virginis, a star of the 4½th mag., will disappear at the moon's bright limb at 9h. 5m. P.M. at a vertical angle of 349°, reappearing at her opposite one (it will really be dark, but uncommonly close to the illuminated part) at 9h. 48m. P.M., at an angle from her vertex of 273°. At noon to-day, when our notes begin, the moon is in the confines of Cetus and Pisces. At midnight on the 2nd she crosses from Pisces into the narrow strip of Cetus running between that constellation and Aries, passing about 2h. P.M. on the 3rd definitely into the latter constellation. Crossing Aries at 5h. P.M. on the 4th, she enters Taurus, through which she is travelling until 7h. A.M. on the 7th, at which hour she quits it for the narrow northern portion of Orion. Her passage over this occupies her until 6h. o'clock in the afternoon of the same day, when she emerges in Gemini. Her passage through Gemini occupies her until 9h. A.M. on the 9th, when she enters Cancer. She has crossed this by 9h. P.M. on the 10th, and entered Leo. She travels through Leo until 10h. A.M. on the 13th, at which hour she quits it for Virgo. In Virgo she remains until 11h. A.M. on the 16th, when she enters Libra. She is travelling through Libra until 7h. A.M. on the 18th, entering at that hour the narrow northern strip of Scorpio. She takes 10 hours, or until 5h. P.M., to cross this, and then emerges in Ophiuchus. At noon on the 20th she leaves Ophiuchus for Sagittarius, which she quits in turn for Capricornus at midnight on the 22nd. She travels through Capricornus until 3h. A.M. on the 25th, when she enters Aquarius. Her journey through Aquarius is completed by 4h. 30m. A.M. on the 27th, at which hour she crosses into Pisces. Her passage through this great constellation occupies until 8h. A.M. on the 30th, when she once more travels into the narrow corner of Cetus, where we found her at midnight on the 2nd. There we leave her.

COMETS FABRY AND BARNARD.

Our notes above have reference, of course, to those familiar objects which are the invariable occupants of our day and night sky. During the present month, however, interest will largely centre in the two interesting comets which are nightly becoming more conspicuous over the north-western part of the horizon. The first was discovered in Paris by M. Fabry, on December 1, 1885, and the second by Mr. Barnard, at Nashville, in the United States, two days later. Our first map shows a portion of the path of M. Fabry's comet, which commences at a point a little to the north of a line joining the two small stars 12 and 14 Andromedæ. Thence it ascends slightly, passing below ι and κ in that constellation. On the 17th it will be pretty close to θ Andromedæ, and on the next night between θ and ρ. On the 22nd it will be a little to the south and west of β Andromedæ. Crossing, then, the extreme north-east corner of Pisces, it will be found in the confines of Triangula and Aries on the 25th, and on the 26th to the north-east of α Arietis. Map II. shows its course during the remainder of April. From it will be gathered that the comet on the 27th will be south-east of ν Arietis; on the 28th south by west of δ Arietis; on the 29th to the east of ξ Tauri, and on the last day of April to the south and slightly to the west of λ. It will rapidly increase in brilliancy as the month advances, and the student will note how its arc in the sky increases nightly in length.

The path of Barnard's comet is depicted in the left-hand portion of Map I. Commencing to the north-east of α Trianguli, it runs up into Andromeda, terminating almost on a line joining γ and τ Andromedæ, but much nearer the smaller star. As in the case of Fabry's comet, this is brightening very perceptibly. Unlike that object, however, which is at its brightest on April 29, Barnard's will not attain its greatest brilliancy until two or three months later. On the night of the 24th the comets will be a little more than 9° apart.

Our Whist Column.

ON THE ORIGINAL LEAD.

By Mogul.

PART I.

TO exhaust this subject so much would have to be said that I certainly would not touch on it were I not convinced that the rule, more or less absolutely laid down by some of the more modern writers, that when trumps are not opened the original lead ought invariably to be from the longest suit, is radically wrong; and, further, that the rule is neither the outcome of experience nor adopted by the finest players of the day.

In considering the point I shall refer only to the first lead of the first player in cases where he does not lead trumps, thus practically excluding all cases where the leader holds five or more trumps, or where the lead is affected by the state of the score (a point which a certain quasi-philosophical writer totally ignores). The reader had better, therefore, in all cases suppose the score to be love all.

A player in opening the hand has to be guided partly by probabilities or chances, but principally by the strength of his own hand. Common-sense will tell him that, with a strong hand, he has a right to play a strong game and risk a little for the chance of winning the game in the one hand; but it will also tell him that, with a weak hand, it would be folly to play a strong game, and that, therefore, he ought to risk as little as possible. With a medium hand he must, so far as he can, play in such a way as will fall in with a strong game if his partner be strong, and hardly risk anything if his partner be weak. In this way he will much more assuredly combine his hand with his partner's than by adopting any fixed rule. It is right, therefore, if he has a long, weak suit, say of five headed by the Ten, with average strength in trumps and strong cards in the other suits, to open the long suit; for, should his partner have two or three cards in that suit with an average strength in trumps, he will probably be able to bring it in, and this probability justifies the risk he incurs of sacrificing any good cards his partner may hold in the suit. And here let me digress. What do you mean, the reader will say, by a long *weak* suit? Is not such a suit numerically strong? My reply is that the expression "numerically strong" is misleading. There is no strength in numbers irrespective of quality. A suit of Ace, King, and Queen is strong of itself, but a suit of six headed by no higher card than a Ten is intrinsically weak; and although, if the holder or his partner holds overwhelming strength in trumps, two or three tricks may be made in it, the suit itself lacks every element of strength. There is no hope with such a suit of capturing a good card of the adversaries', nor even, except by extrinsic aid, of making a trick in it; and, further, it is a weakness in a hand as seriously diminishing the chances of holding a really strong suit. To say, as Proctor says, that a suit of Two, Three, Four, and Five contains an element of strength because of the possibility of the Five being the thirteenth card is, so it seems to me, very loose language. If the remote possibility of making a trick is to be regarded as an element of strength, there almost must be in the hand some other suit containing a more reliable element of strength, and the argument based on this supposed element of strength would fail.* But, picking up the thread of my remarks, he would not be justified in opening such a suit if he held but two small trumps and a suit which he could lead without risking loss to himself or partner, say Knave, Ten, and Two, or even Knave and Two. The Knave in the latter case, and the Knave or Ten in the first case, must fall in the first two rounds; and, by leading it at once, a player effects two desirable objects—he strengthens his partner's hand by forcing out the adversaries' good cards in that suit, and prevents his own good card being wasted by falling to a better one led by his partner.

It seems to me to be downright folly to adopt the long suit system in obedience to mere theory when there is no reasonable chance of establishing it. It is playing an offensive game with a weak hand, and is opposed to the most important of all canons of play, viz., that play must vary with the circumstances. No wonder, therefore, that Pole, who lays down an absolute rule of leading from the long suit, admits that the object aimed at more frequently fails than succeeds, but in extenuation he alleges that no disadvantage arises from the attempt if unsuccessful. This is really

* If those who contend that mere numbers constitute strength are right, then a hand consisting of two plain suits, one of seven headed by the Eight, and another of six headed by the Seven, is a very strong hand. But does the reader think so?

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coming it strong, considering that the fourth player will every other time on an average take your partner's best card, and if your partner holds the ace, it will generally be played without killing a good card of the adversaries, and Pole calls this no disadvantage! Now Cavendish admits the danger of finding your partner very weak, or of sacrificing what strength he has, but argues that, although your chance of establishing a Five suit is slight, yet, by leading it, you avoid assisting your adversary in establishing his long suit. This argument is weighty, and infinitely better than Pole's, but yet I submit not strong enough to induce us to lead from a long weak suit of 5, without an honour, when we have stronger suits, such as a suit of 4 with 2 honours, or even when our other suits are weak, but one of them contains a strong card which we can lead without harm to ourselves, and with a very good chance of assisting our partner. Although I do not regard even Clay as infallible, he is as near to it as any whist writer is likely to be, and he says:—"A lead from a Queen or Knave and one small card is not objectionable, if you have a miserably weak hand, or one in which the lead from any of the other suits is manifestly disadvantageous," and again: "A lead from Queen Knave, and one small card or Knave Ten and one small card is not bad when you have no better suit." Whilst on the point of the advantage of leading strengthening cards, I would note that it has struck me that Cavendish's and Pole's advocacy of invariably leading from the longest suit is partly due to mistaken ideas of the effect of leading strengthening cards. Cavendish, in his first edition, when explaining the advantages of leading strengthening cards, added:—"No doubt you are twice as likely to *strengthen your adversaries*, but with a wretchedly weak hand this cannot be avoided," and Pole says:—"The effect of leading strengthening cards is to benefit the hand that is longest in the suit," and adds that as it is two to one that the longest hand is with one of the adversaries, the chances are that you favour the opponents' hands, so that, according to Pole, if I lead a Queen and my partner holds King Knave Ten and one other and either adversary the Ace and four others, my lead of the Queen has benefited the adversary, and not my partner. Cavendish has omitted this absurdity in his later editions, but is it not possible that the feeling which permitted him to say it still somewhat warps his judgment?

Further, if it be objectionable, as above argued, to lead from a weak suit of five, much worse is it to lead from a weak suit of four, for you equally incur the risk of sacrificing your partner's good cards without the possibility of remaining with two or three long cards of the suit, and with less chance of remaining with even one long one. For these reasons, holding Knave or Ten with one other, I should prefer (as I believe do nearly all our best players) to lead it rather than lead a small card from Knave or Ten with three small ones. One feels that the lead from the latter suit may sacrifice one's partner's King or Queen without any benefit to oneself or partner. The lead from King or Queen and three small ones is not so objectionable; but I certainly should myself always prefer leading Knave from Knave, Ten, and another, to opening a suit of King and three others, unless the highest of the three was a Knave, Ten, or Nine. The objection that the lead of the Knave may be mistaken for a lead from strength may be disregarded, for it will be but rarely that your partner will not be able, even on the first round, to infer whether your Knave is a strengthening card or not; and, if he cannot be sure, he will, if a good player, not jump to the conclusion that it is a lead from strength.

For the above reasons, I contend that an inflexible rule of leading from the longest suit cannot be a good one, and that the only excuse for leading from a long weak suit, when there is no hope of making long cards in it, is that to open any other would be equally disadvantageous to your partner, and probably more advantageous to your adversaries, and that this can never be said when you can lead a strengthening card from one or two others.

It will perhaps be contended that I am ignoring the advantage of the information given by a rigid adherence to the rule of opening the longest suit. I have, however, taken this into consideration. Even assuming that the balance of advantage of the information so given rests with yourself and partner, I think it very dearly purchased when the price paid is the sacrifice of your partner's good cards. Further, I find in actual play that the knowledge that an adversary has a number of small plain cards is one of the most useful data in judging whether to lead trumps or not; and I hold that to play badly merely to give information is, except in very rare instances, downright irrational, and to sacrifice the good cards of one partner, so that other partners may be assured that you have four at least in your original lead, is hardly fair to your partner for the time being; consequently I protest against the advice too often given to young players to play for some time by fixed rules, "in order to earn a character." What right has any one to play any hand otherwise than appears to him most beneficial, in order that he may get a benefit to himself at the expense of his partner? But, over and beyond this, I consider all attempts to tie the hands of whist-players and to put an end to individual judgment by rigid rules of play most objectionable in principle, and that no player who is admitted by his brother-players to be skilful above the average should submit to be so tied, at any rate not unless he knows that the person who wants to bind him is quite at the top of the tree; for, notwithstanding Pole's assertion that the dicta of Clay owe their chief value to the fact that they admit of being demonstrated by philosophical reasoning, I have more respect for the dicta of Clay and other fine players, as pure dicta, than I have for all the so-called philosophical, but in some cases downright illogical, reasons stated by Pole.

I propose in the next part to insert some hands submitted to a number of our best players for their opinions on the original lead and to state the results.*

HANDS ARRANGED BY "MOGUL."

Hands.	Trumps, Spades.	Clubs.	Hearts.	Diamonds.
No. 1	Kg., 8	10, 9, 7, 6, 4, 2	A., Kg., Q.	Kn., 10
„ 2	9, 8	9, 8, 7, 6, 3	A., Kg., Q.	A., Kg., Q.
„ 3	5, 3, 2	10, 9, 8, 7, 6	A., Kg., Q., Kn.	Kg.
„ 4	5, 4, 3, 2	5, 4, 3, 2	A, Kg., Q.	A., Kn.
„ 5	Q., 4, 3	Kg., 6, 5, 2	Q., 7, 6, 3	Q., Kn.
„ 6	Q., 10, 9	6, 5, 4, 3, 2	Q., Kn., 10	Kn., 10
„ 7	Q., 10, 9	Kn., 8, 7, 4	10, 8, 6, 4	Kn., 9
„ 8	Kg., 6, 2	Kn., 6, 5, 4	Q. Kn., 10	Kn., 10, 9
„ 9	9, 8, 5, 4	Q., Kn., 8	Kn, 10, 2	A., Kg., Q.
„ 10	A, Q., 10, 2	Kg., Kn., 3, 2	Kg., Q, Kn.	10, 9

What card should first player lead from above hands—first, when the score is love all; and secondly, when the score is four love?

These hands are not intended to be difficult, but solely to test how far players of admitted skill feel themselves bound to lead from their longest suit, rather than exercise their individual judgment as to the best card to lead from each hand as it arises. They are therefore asked, What card they would themselves lead? not which one they would advise a beginner to lead.

Our Chess Column.

By "Mephisto."

The following is the eleventh game of the match for the championship, played at New Orleans on March 1:—

Four Knights Game.

White. Zukertort.	Black. Steinitz.	White. Zukertort.	Black. Steinitz.
1. P to K4	P to K4	17. B × P (ch) (*f*)	K × B
2. Kt to KB3	Kt to QB3	18. Q to R5 (ch)	K to Kt sq
3. Kt to B3	Kt to B3	19. R to R3	P to B3
4. B to Kt5	B to Kt5	20. Q to R7 (ch)	K to B2
5. Castles	Castles	21. Q to R5 (ch)	K to B sq
6. Kt to Q5	Kt × Kt	22. Q to R8 (ch)	K to B2
7. P × Kt	P to K5 (*a*)	23. Q to R5 (ch)	K to K2 (*g*)
8. P × Kt	P × Kt	24. R to K3 (ch)	K to B sq
9. Q × P	QP × P	25. Q to R8 (ch)	B to B sq
10. B to Q3 (*b*)	B to Q3	26. B to R6	R to K2 (*h*)
11. P to QKt3	Q to Kt4 (*c*)	27. R × R	K × R
12. B to Kt2	Q × QP (*d*)	28. B × P	Q to KB4!
13. B to B sq (*e*)	Q to QR4	29. R to K sq (ch)	K to B2!
14. B to KB4	B to K3	30. B to R6	Q to R2
15. QR to K sq	KR to K sq	31. Q × Q	B × Q
16. R to K3	B to Q4	32. P to QB4	P to R4

White resigned on his forty-second move.

NOTES.

(*a*) Leading to an even game. Played by Gunsberg against Ranken in the 83 Tournament.

(*b*) This points to an attack on the K's side, the prospects of which cannot be considered favourable. White might have played 10B to B4.

(*c*) An excellent move, which gives Black the advantage—he threatens Q to K4, also to bring his QB into play.

(*d*) Steinitz himself adopted somewhat similar tactics in his sixth game. It seems that in the present instance this QP can be taken.

* These hands I venture to publish here, as it will, I think, add greatly to the readers' interest in "Mogul's" second paper to have had the opportunity of studying the hands first by himself.—Ed.

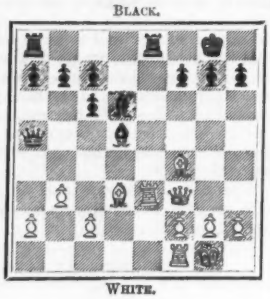
(*e*) In order to prevent the exchange of Queens by Black playing Q to B5.

(*f*) White, we think, would not have given up this piece if he had not been minus a Pawn. The attack, though considerable, does not promise a win. It does, however, seem as if a draw by perpetual check always remained available. That this was not the case is due to Black's correct play and capital defence. White would gain nothing by playing 17Q to R3, P to KKt3, &c.

(*g*) In order to gain time, Black four times played his K to B sq and B2 before playing K to K2.

(*h*) If P × B White draws by perpetual check.

Black.



White.

The following was played in the late Tournament at the British Chess Club. It contains a noteworthy variation of the French defence :—

White I. Gunsberg	Black J. Mason	White I. Gunsberg	Black J. Mason
1. P to K4	P to K3	12. Kt to K5 !	P to B3
2. P to Q4	P to Q4	13. Castles (*g*)	P to KR4
3. Kt to QB3	B to Kt5 (*a*)	14. Kt (K5) to B7	R to R2
4. B to Q3 (*b*)	P to QB4	15. Q to B3 ! (*h*)	Q to R4
5. P × BP (*c*)	P to Q5	16. P to K5	Q to B3 (*i*)
6. P to QR3	Q to R4 (*d*)	17. P × P	Q × Q (*j*)
7. P × B (*e*)	Q × R	18. P × Kt (ch)	K × P
8. Kt to Kt5	Kt to QR3	19. P × Q	B to Q2
9. Kt to Q6 (ch)	K to Bsq	20. B to Kt5 (ch)	K to B sq
10. B × Kt	P × B (*f*)	21. Kt to K5	B to K sq
11. Kt to B3	Kt to K2	22. R to Q sq	Resigns

NOTES.

(*a*) Many players do not like this move, and give preference to Kt to KB3, and keep the B on K2.

(*b*) 4. P × P is usually played here. In reply to 4. B to Q3, Black's best is P × P. 5. B × P, Kt to KB3, whereby he gains time for development.

(*c*) 5. P × QP is also admissible.

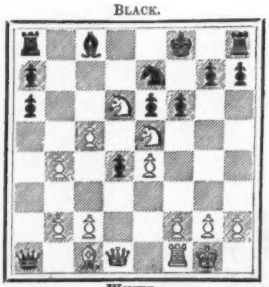
(*d*) This is bad, and leads to a lost game. If, instead B to R4, then 7. P to QKt4. P × Kt. 8. P × B, Q × P. 9. B to K3, Kt to Q2. 10. Kt to K2, with an even game.

(*e*) White obtains a piece and two Pawns, with a strong attack, for the Rook.

(*f*) Q × B is preferable.

(*g*) This move gives White an overwhelming attack. Black dare not take the Kt; he would speedily lose, as White could then play. 14. Q to B3 (ch), compelling Kt to B4, then 15. P × Kt would be fatal. White also threatens now to play Q to R5, against which move Black must be on his guard. Black's game, however, is hopelessly compromised now.

Black.



White.

(*h*) Threatening 16. P to K5, also 16. B to Kt5, followed by 17. B × P and 18. Q × P, &c.

(*i*) If Kt to K4 instead then follows. 17 Kt to K Kt5, R to R sq. 18. Kt × B, R × Kt. 19. Kt × P (ch), K moves. 20. Q × Kt and wins.

(*j*) If P × P instead, White continues with 18. Q × P.

An interesting variation in the Scotch defence :—1. P to K4, P to K4. 2. Kt to KB3, Kt to QB3. 3. P to Q4, P × P. 4. Kt. × P, Kt to B3. This is the German defence to the Scotch gambit, and should lead to an even game. Zukertort played it throughout in his match with Blackburn.

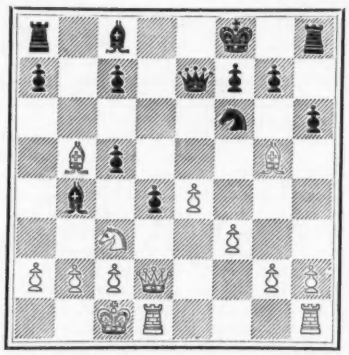
If now White plays 5. Kt × Kt, Kt P × Kt. 6. B to Q3, P to Q4. 7. P to K5, Kt. to Kt. 5. 8. Castles, B to QB4 (threatening Q to R5). 9. P to KR3, Kt × KP. 10. R to K sq, Q to B3. 11. Q to K2, Castles. 12. Q × Kt, Q × P (ch). 13. K to R sq, B × RP. 14. P × B, Q to B6 (ch). 15. K to R2, B to Q3 winning.

Another variation in which Black's development proceeds on the Q side is as follows :—5. Kt × Kt, Kt P × Kt. 6. P to K5, Q to K2. 7. Q to K2, Kt to Q4. 8. P to QB4, B to R3. 9. P to Q Kt3, Castles, &c. From these two variations it may be seen that the advance of the KP does not result favourably for White. Steinitz played in his second game against Zukertort :—

5. Kt to QB3	5. B to Kt 5.
6. Kt × Kt.	6. KtP × Kt.

Now White proceeded with 7. B to Q3, P, Q4. 8. P × P, P × P. 9. Castles, Castles, and the game became even. Another way of continuing the attack is by playing 7. Q to Q4, which produces some exciting play.

7. Q to Q4	7. Q to K2
8. P to B3	8. P to Q4
9. B to KKt5	9. P to B4
10. B to Kt5 (ch)	10. K to B sq (best)
11. Q to Q2	11. P to Q5
12. Castles	12. P to KR3 (best)



Obviously Black could not take the Kt, on account of 13. Q to Q8 (ch). Black would not improve his game by playing B to Kt2; for, although White is thereby prevented from playing Q to Q8 (ch), he will have a good game—*i.e.*, 12. . . . B to Kt2. 13. Q to B4, P × Kt. 14. P to K5, with a strong attack.

13. B × Kt

If the B retires, then P to Kt4 follows, making room for the K, which then enables Black to play P × Kt.

	13. P × B
14. P to QR3	14. P × Kt
15. Q to Q8 (ch)	15. Q × Q
16. R × Q (ch)	16. K to Kt2
17. R × R	17. P × P (ch)
18. K × P	18. K × R
19. P × B	19. P × P

With an advantage for Black.

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